

# NAVAL AVIATION NEWS

THE FLAGSHIP PUBLICATION OF NAVAL AVIATION SINCE 1917

SPRING 2017

## MODERNIZING TRAINING

### WHAT'S INSIDE

- ▶ Watching JOs Innovate
- ▶ Producing Ready, Relevant Learning
- ▶ HSC-25 Employs High Velocity Learning
- ▶ Hitting Print: Additive Manufacturing







*As we continue to celebrate the 100th anniversary of Naval Aviation News, the U.S. Navy's oldest periodical, we want to encourage more fleet submissions and stories on the Naval Aviation mission. This issue contains three articles written by naval aviators and maintainers and we know you all want to see more as well. Email your story ideas and contact info to [nannews@navy.mil](mailto:nannews@navy.mil) and we'll follow up. — Ed.*



*Sailors walk across the flight deck of aircraft carrier USS Dwight D. Eisenhower (CVN 69) as the IKE conducts a routine, scheduled transit through the Suez Canal.*

U.S. Navy photo by MC3 Nathan T. Beard

# NAVAL AVIATION NEWS

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## ON THE COVER



Marines with Marine Operational Test and Evaluation Squadron (VMX) 1 replace an F-35B Lightning II LiftFan for the first time at sea aboard amphibious assault ship USS America (LHA 6) during the short takeoff and vertical landing (STOVL) variant's third and final shipboard developmental test phase in November. (U.S. Navy photo by Kyle P. Hafer)

Across the Navy and Marine Corps, aviators, Sailors, Marines, squadrons, instructors and training centers are modernizing training by reassessing and reinventing their approaches. In *Flightline*, page 4, Capt. Ben Reynolds, commander, Helicopter Sea Combat Wing Pacific, applauds the innovative culture at Helicopter Maritime Strike Weapons School Pacific and encourages leaders to create similar environments. On page 16, the Nimitz Strike Group (CSG) becomes the first CSG to use the fleet warfighting training live, virtual and constructive (LVC) training concept. On page 18, learn how the Naval Air Warfare Center Training Systems Division is supporting CNO's Sailor 2025 initiative by exploring how and when training is delivered to Sailors. On page 26, Helicopter Sea Combat Squadron (HSC) 25 Sailors apply CNO's high velocity learning principles to accelerate multi-system qualifications.

**On the Back Cover:** Marine KC-130J crewmasters Pfc. Vivian Beppler, left, and Master Sgt. Baron Morales guide Marine infantrymen from 2nd Battalion/6th Marines aboard their aircraft at the Strategic Expeditionary Landing Field at Marine Air-Ground Combat Center Twentynine Palms, Calif., as part of the Marine Weapons and Tactics Instructor course in February. (Photo courtesy of Joe Copalman)

*The U.S. Navy's Oldest Periodical, Established 1917*



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# Flightline

## Watching Junior Officers Innovate

### Landing in the Dirt with Habu and Feather

Capt. Ben Reynolds, Commander, HSC Wing Pacific

The approach to our landing was absurd.

Instead of looking through my night vision goggles and single-handedly flying the helicopter to the deck like I had trained my entire career, I hunched over and stared at the small acceleration gauge in front of me.

I made tiny control changes while three people gave me precise instructions. What's more bizarre, I "gave" the other pilot the collective, and I just controlled the cyclic. That's like asking your car passenger to push the gas and the brake while you hold the wheel.

And making it worse was the environment. We had progressed to more and more challenging conditions—a no-moon night to the sandiest, crummiest landing zone we could find in the Southern California desert, not the type of night the crusty old commodore would normally seek out for currency.

We were landing in the toughest degraded visual environment (DVE), and I couldn't see a thing. In fact, I was so intent on my gauges, I was surprised when the ground came up to meet my tail wheel first and then my main landing gear. Lt. Alexander "Feather" Campbell, my weapons and tactics instructor (WTI), reduced the collective, and the aircraft was safe on deck. "Great—let's take it around again, sir," he said.

In 2014, naval aviators crashed four MH-60 Seahawk aircraft landing in DVEs. Every service has struggled with DVE mishaps, crashing dozens of helicopters in DVEs over the last decade. We were crashing aircraft in a specific maneuver, and we needed solutions. Naval Aviation attacked the problem by making several changes to training and doctrine. We even secured Naval Air Systems Command's permission to fly the aircraft with the doors off, a very effective way to improve visibility close to the deck. But the most effective—and most radical—change has been adopting two innovative approaches: the "DVE Steep," in which the aircrew flies the aircraft down a steep glideslope to the deck on gauges, and the "DVE Hover," the control-swapping maneuver in which the crew brings the aircraft to a hover above the dust storm we create and then lands vertically through the cloud.

Today, the Department of Defense is encouraging a culture of innovation, an often challenging concept in a large organization. Yet these new approaches Feather taught are exactly the type of incremental "small-ball innovation" that drives us forward and makes a significant impact in our helicopter community.

While we value innovation, change is often difficult to embrace. A few years ago, several Army and Air Force special operations commands started introducing similar DVE approaches, but they never reached wide acceptance in any service. Aircraft differences and a lack of communication





*An MH-60S Seahawk helicopter prepares to land during a training mission at Marine Corps Base Camp Pendleton, Calif.*

between organizations halted the progress. These approaches are not embraced because they are radically different from how helicopter pilots have always been trained. Most commanders don't even get beyond the PowerPoint description of the maneuver before they dismiss the idea completely.

But Helicopter Sea Combat Weapons School Pacific, where Feather was a pilot, developed an environment that allowed strange ideas to grow. They cultivated an innovation lab from an existing organization without requiring a new structure or additional resources. They work out of an old building; they don't have floor-to-ceiling windows, beanbag chairs or an indoor jump-around gym. But they keep coming up with good ideas that are just a little bit different and are ready to embrace change if it improves their tactics, techniques and procedures.

Maj. Chris "Habu" Walker, a U.S. Air Force exchange pilot, fit right into this environment. He came to the weapons school and described a radically different way to land the helicopter. The weapons and tactics instructors listened. They asked a million

questions. Then, young aviators Feather and Habu took a couple of field trips to visit Army and Air Force commands. They decided, after a few adjustments to fit our aircraft and tactics, this radical idea could pay huge dividends for Naval Aviation.

### **Leading Innovation: Where We Can Help**

Our Navy is hungry to tap into the innovative talent of 350,000 minds. We often pursue innovation by carving out distinct "change" organizations, but it doesn't seem to work when we put 10 people in a room and tell them to deliver quarterly updates on innovative ideas to win wars. The simplest way for us to encourage innovation is to create an environment within our existing squadrons and ships where good ideas can germinate. But this isn't easy, and it's even harder to maintain this initiative over time.

For the helicopter community, this weapons school continues to be that special place. From developing new joint exercise opportunities on a shoestring budget to rebuilding our tactics and procedures for the maritime fight, the school repeatedly proved their incremental innovation is not

a lucky break, but a sustained environment where good ideas grow.

Feather and Habu's example demonstrates a few simple innovation principles for leaders at every level to consider: set a vision, cultivate an innovative environment, wrestle with the risk and follow through. We must do all these things for a new idea to take root.

### **Set a Vision**

As leaders, we must set clear intent without constraining how our people meet that intent. There are times we need to give narrow guidance. When possible, however, we should make the boundaries wide and be prepared for new approaches and different solutions. This isn't easy. Feather, Habu and their fellow WTIs feel free to attack issues with a clear understanding of our purpose. But, they often come up with a different solution that wouldn't occur to me or our commanders.

### **Cultivate the Environment**

Cultivating and maintaining an environment for innovation takes untiring, focused effort. It is often less efficient in

the short run. We have to create habits of an innovative culture by constantly testing ideas, citing examples and embracing innovative solutions. Habu's idea was unusual. The weapons school only considered his idea because leaders spent precious time cultivating an environment where initiative is valued.

It's just as hard for leaders within an organization to provide this space as ideas percolate. Most ideas die under the pressure of the big, grinding organization before they have a chance to show their benefit. Adm. Scott H. Swift, Pacific Fleet commander, calls this "the frozen middle"—the level of bureaucratic leadership that resists change and stifles potential innovation. The frozen middle repeats itself at every layer of our large organization.

## Wrestle with Risk

Grappling with risk isn't merely an academic concept within our Navy. In our organization, risk has a real cost measured in mission failure, dollars and lives. As leaders, we must confront risk continuously. We also must continue to develop

our capacity to tolerate risk if we want our people to innovate. In this situation, we continue to wrestle with risks as different squadrons and different pilots learn the new approaches Feather taught me.

## Follow Through

We struggle most with follow-through. All too often, those of us who generate change and innovation are too quick to move on to the "next great idea." We see countless promising ideas and "lessons-learned" that don't take hold. These new ideas are fragile and need to be shepherd into practice. This requires sustained effort and persistence to codify a new approach into an institution that prefers to rely on trusted practices.

Our Navy has a rare opportunity. Our senior leaders today genuinely encourage innovation and are willing to accept risk associated with innovation. Young men and women join the Navy today to make a difference, and they are ready to contribute. We should embrace this rich resource of human ideas. As leaders, it's our respon-

sibility to provide a vision, cultivate an environment for ideas, confront risk and ensure the new, fragile ideas don't die before they take root.

At the end of the flight, Feather and I sat in the aircraft and ran our engines as our maintainers finished the water wash. We were tired. Feather told me about his recent visit to the Naval Academy where a few midshipmen remarked cynically that it's hard for junior officers (JOs) to make a difference in a big bureaucratic organization. Feather disagreed. He was a JO on his second tour. He was a part of a great organization. He was training pilots to fight and win in combat. Feather was clearly making a difference for his nation, and he was also part of a special organization that kept coming up with crazy, incremental improvements that rippled through our big, ungainly organization. Feather is an innovator.

*Capt. Ben Reynolds is commander, Helicopter Sea Combat Wing Pacific.* ✈

**Capt. Ben Reynolds** is from Jones, Oklahoma, and graduated from the United States Naval Academy in 1992 with a Bachelor of Science degree in economics. He reported to flight school and earned his wings in November 1994.

Reynolds' previous operational assignments include tactics officer and assistant officer-in-charge (OIC) in Helicopter Combat Support Squadron (HC) 6, deploying twice in support of operations in the Balkans and Africa. He was tactics officer, maintenance officer and detachment OIC in Helicopter Sea Combat Squadron (HSC) 26 where he participated in Haiti relief operations. Reynolds commanded the "Island Knights" of Helicopter Sea Combat Squadron (HSC) 25 in Guam. He deployed twice to Iraq while at HSC-25.

Reynolds' last staff assignment was operations analyst and executive assistant on the CNO's Assessment Division (OPNAV N81 and N00X). Previous staff assignments include: operations action officer on the CNO's staff; flag aide to the deputy CNO for plans, policy and operations (N3/N5); flag aide to commander, U.S. Naval Forces Central Command/U.S. Fifth Fleet; joint staff action officer in the Joint Operations Directorate, J-3; and as executive assistant to the joint staff deputy director for regional operations.

Reynolds is a 2014 graduate of the National War College. He also holds a masters in systems analysis from the Naval Postgraduate School, and a masters in international affairs from George Washington University. His personal decorations include the Legion of Merit, Bronze Star, Defense Meritorious Service Medal, Meritorious Service Medal, Air Medal and other unit and campaign awards. ✈



U.S. Navy photo by MC3 Kelsey L. Adams



# Grampaw Pettibone

Gramps from Yesteryear: May 1967

Before well-known artist Ted Wilbur first illustrated “Grampaw Pettibone” for Naval Aviation News in 1994, there was Robert Osborn, who in 1943 created the “sage of safety” character. From 1943 until he stepped down in 1994, Osborn’s illustrations could be seen in the pages of Naval Aviation News. Here is a 50-year peek back in time to 1967. — Ed.

## Cliff Hanger

The ship and air wing were in the middle of an Operational Readiness Inspection being conducted in tropical waters. This particular A-4 driver was returning from a mission that had been normal in all respects. As he approached the 1800 position, he checked the brakes and found them to be firm. The pass, touchdown and arrestment were uneventful.

During disengagement from the wire however, the pilot noted that the starboard brake was soft. As he commenced taxiing up the axial deck, he realized that the starboard brake had failed completely. He immediately announced his predicament over the radio to the air officer, opened the canopy and gave visual signals for the chocks to the flight deck crew.

In spite of several crewmen trying to restrain the wayward A-4, it continued up the axial deck. Ladders and other objects tossed beneath its nose wheel had little, if any, effect. Just about half way up the axial deck, the pilot lowered his hook. (By this time it was quite evident to those on deck that he had brake failure.)

The Skyhawk continued its jaunt and rolled over the bow on the centerline. The aircraft fortunately was stopped by the safety net from going over the edge completely. It came to rest in a 900 nose-down position with the drop tanks penetrating the nets, but holding.

The aircraft was secured immediately to the flight deck with chains and, when it was considered safe, Tilly was brought forward to hoist the pilot clear of the cockpit and pluck the A-4 from its perch. 🐦



## Grampaw Pettibone says ...



Holy mackerel! Somebody coulda got hurt and we coulda lost an aircraft in this fiasco. It was only a year ago that ole Gramps waxed this same subject, but good. Seems like we need to take a look at this situation.

First thing this lad should've done was to lower the tailhook immediately to let folks know he had brake troubles. Secondly, he coulda secured that engine and used that good brake to ground-loop that bird and keep it on deck. Of course, every incident is different and no set rules can ever replace good headwork.

As the old sayin' goes—don't worry about what may happen to you; worry about what you're going to do when it happens. 🐦

Illustration by *Osborn*

# Airscoop

Compiled by Andrea Watters  
and Jeff Newman

## USS Abraham Lincoln Underway for Sea Trials

NEWPORT NEWS, Va.—The first aircraft carrier to accommodate the F-35C Lightning II, USS Abraham Lincoln (CVN 72) got underway for sea trails May 9 following a four-year refueling and complex overhaul (RCOH) at Newport News Shipbuilding, Newport News, Virginia.

The four-day sea trials marks Abraham Lincoln's first time underway since March 2013. The ship spent its last days in the shipyard completing a five-day "fast cruise" from May 2-7, making final preparations for its transit to Naval Station Norfolk.

"We are looking forward to taking the ship out on the open water where we belong," said Capt. Amy Bauernschmidt, Lincoln's executive officer. "I am honored to serve with our crew. This dedicated and impressive group put an incredible amount of work into revitalizing this ship. We are grateful for their efforts and to our partners at Newport News Shipbuilding, and eagerly anticipate completing successful sea trials and returning to the fleet ready for tasking later this year."



U.S. Navy Photo by MCS Alexis N. Romero

*The sun rises as Nimitz-class aircraft carrier USS Abraham Lincoln (CVN 72) prepares to depart Newport News for sea trials.*

During sea trials, the crew will undergo multiple training scenarios and qualification evolutions to include engineering maneuvers designed to evaluate the performance of the ship after the extensive maintenance period.

"Our team has worked hard to get USS Abraham Lincoln ready to redeliver to the fleet," said Rear Adm. Brian Antonio, program executive officer for aircraft carriers. "She has undergone significant combat systems modernization and will also be the first CVN capable of accommodating the F-35C Lightning II. This RCOH enabled the ship to meet future missions and continued service life requirements for many years to come."

During RCOH, more than 2.5 million man-hours of work were conducted aboard the ship, including refueling the reactors, upgrading ship infrastructure and modernizing combat systems and air wing capabilities to increase combat effectiveness.

Abraham Lincoln is the fifth Nimitz-class aircraft carrier to complete RCOH, a major lifecycle milestone at Newport News Shipbuilding. She returns to the fleet as one of the most modern and technologically-advanced Nimitz-class aircraft carriers in service and will continue to be a vital part of the nation's defense for an additional 25 years.

*Written by Mass Communication Specialist 1st Class Mark Logico, USS Abraham Lincoln Public Affairs.* 🇺🇸



F-35B Lightning II

## Exercise Integrates F-35B into Fleet

SUFFOLK, Va.—Nearly 200 Navy, Marine Corps and civilian personnel concluded a weeklong exercise aiming to successfully integrate the new F-35B Lightning II into the fleet.

The exercise was comprised of a wide variety of military service members, industry partners and technical experts.

The F-35B Ship Sustainment Wargame focused on the Marine Corps F-35B, using a "day-in-the-life" approach to

analyze operations and logistics integration with the Navy's amphibious assault ships. This event was the culminating activity of nine months of preparation, led by Vice Adm. Thomas Rowden, commander, Naval Surface Forces, in partnership with Headquarters, Marine Corps Aviation and Commander, Naval Air Forces.

The exercise was the first of its kind for the F-35B and the Navy-Marine Corps team, and was successful in synchronizing efforts in anticipation of future amphibious ready group and Marine expeditionary unit deployments.

"The Ship Sustainment Wargame is one of the best venues to utilize in order to educate, analyze or find possible problem issues for the F-35B as it prepares for deployment aboard our L-class ships," said Gunnery Sgt. Hector Pacheco, one of the key exercise participants and an F-35B maintenance adviser assigned to Marine Operational Test and Evaluation Squadron (VMX) 1.



## Ike Completes 300,000th Arrested Landing

U.S. Navy photo by MCS Zach Sleeper



*Sailors watch as a T-45C Goshawk approaches the flight deck of aircraft carrier USS Dwight D. Eisenhower (CVN 69).*

ATLANTIC OCEAN—When the crew of aircraft carrier USS Dwight D. Eisenhower (CVN 69), also known as Ike, saw the ship's first Commanding Officer, Capt. William Ramsey, make the first launch off the flight deck Sept. 15, 1977, few probably thought the 17th commanding officer would one day announce the ship's 300,000th successful arrested landing.

On March 19, Commanding Officer Capt. Paul Spedero Jr. made that announcement. It gave the crew an impressive round number, showing just how much the carrier has accomplished in the nearly 40 years since its commissioning.

"I appreciate being here to witness it and getting to be part of the team that made it happen," said Cmdr. Jeremy Rifas, the ship's air boss, who directs flight operations.

Launching aircraft from a platform at sea requires several divisions working together. Ike's Sailors have worked tirelessly

to learn and teach their art over the years, making the current procedures used by trained professionals an achievement accomplished by countless Sailors over the past four decades.

"Every landing on a ship is a very precise thing," Rifas said. "When you get 300,000, it's a pretty big testament to the skill of the aviators and the personnel who maintain the recovery equipment. It's an incredible feat."

During Ike's deployment last year and through its recent training-related underway periods, the ship has maintained a consistent schedule of launching and

recovering aircraft throughout the day and night.

"It shows the combat-ready history of the ship," said Chief Aviation Boatswain's Mate (Equipment) Gerard Dindial, leading chief petty officer of air department's V-2 division, which is responsible for maintaining the steam catapults and arresting gear. "The primary mission of the ship is to launch and recover aircraft, so it's very important that we can count on the equipment to recover them safely."

That translates into long hours for V-2 Sailors, but it is a job in which they take great pride. Their leading petty officer, Aviation Boatswain's Mate 1st Class Marcus Snedeker, said they impress him daily.

"Our Sailors work hard," he said. "They work long hours to keep the equipment running. For a ship to have done so much and still be running just fine, it shows that these Sailors know what they're doing and how they knock it out of the park every day."

On a daily basis, they perform preventative maintenance and corrosion control; conduct repairs on the machines behind the curtain and below the flight deck; and make landing a plane without a full-sized landing strip possible.

"Bravo Zulu' to the team," Snedeker said. "They're doing an amazing job. For a lot of them, this is their first time with hands on the equipment, and they've caught on to what we do down here very quickly."

Ike is underway conducting carrier qualifications during the sustainment phase of the Optimized Fleet Response Plan.

*Written by Mass Communication Specialist Petty Officer 3rd Class Liam Antinori, USS Dwight D. Eisenhower (CVN 69) Public Affairs.*

The Marine Corps declared the F-35B operational nearly two years ago, July 2015, at Marine Corps Air Station (MCAS) Yuma, Arizona. Since then, Navy and Marine experts have teamed together to integrate its technologies and capabilities.

"I think anytime you introduce a new platform in the Navy-Marine Corps team, there's bound to be some integration issues," said Capt. Matthew Hahn, Navy lead for the exercise. "My hope for and intent of this exercise is to identify and solve some of those integration issues by leveraging the experience and expertise of the participants."

The F-35B is replacing the venerable AV-8B Harrier and the Marine Corps will be the first service to deploy with the jet in 2018. Marine Fighter Attack Squadron (VMFA) 121 recently departed MCAS Yuma, transferring to MCAS Iwakuni, Japan, in January.

*From Naval Surface Forces Public Affairs.*

## Osprey Helps Broaden Marine Corps' Missions



U.S. Marine Corps photo by Lance Cpl. Miranda Faughn

*An MV-22B is directed after landing aboard Marine Corps Air Station (MCAS) New River, N.C.*

MARINE CORPS AIR STATION CHERRY POINT, N.C.—The pilot strode across the flight line to his aircraft, and after climbing into the tight cockpit, began running preflight checks on the MV-22 Osprey he would spend the next hour flying. The steady whir of the engine slowly became a roar as the rotors spun violently before taking off from Marine Corps Air Station (MCAS) New River, North Carolina, Feb. 9.

Marines attached to Marine Medium Tiltrotor Squadron (VMM) 263, Marine Aircraft Group 26, 2nd Marine Aircraft Wing, were conducting a troop transport operation with Marines attached to Advanced Infantry Training Battalion, School of Infantry East.

Marine Corps Capt. Stephen Smith, a pilot with VMM-263, said the unit conducts similar operations three or four times a week, supplemented with a variety of other training.

“[The Osprey] has one of the broadest mission sets of any of the Marine Corps aircraft,” Smith said. “So, I like

the various things we get to do. We don’t get stuck doing the same thing every day.”

The Osprey has been an operational asset to the Marine Corps for more than a decade, transporting external loads, conducting aerial deliveries, using low-altitude tactics and putting troops on the ground.

“Since it is such a versatile platform, and a lot of people want to employ the Osprey in various missions, we have a lot of work on the table,” Smith said. “There are a lot of things we can do, so it keeps things varied and exciting.”

Smith said he considers the biggest structural difference between the Osprey and any other aircraft to be the double rotors on top and its ability to fly as a fixed-wing aircraft. “Not to take away at all from what other helicopter pilots do,” he added, “but it does impact the way we fly to have two propeller rotors side-by-side rather than the typical one with a tail rotor.”

Some missions are more intensive for the pilots, said Marine Corps Cpl. Matthew Santilla, a crew chief with

VMM-263, noting some operations require pilots to rely on the crew chief.

“Aerial refueling is more intensive on pilots,” Santilla explained. “External lifts, where we pick up loads with a rope and hook, are more intensive on crew chiefs. Day to day, I assist with maintenance, but on days when I fly, I am the pilot’s backseat driver. We keep the pilots true in what they do.”

As technology has steadily developed in aviation, Marine Corps Osprey pilots make good use of the aircraft’s unique capabilities to get into areas that normally are reserved for helicopters, because they can transition into airplane mode to cover more ground.

“The mission of our squadron is primarily to provide assault support to the various units we are coordinated with and provide them training opportunities,” Smith said. “Abroad, we support them in their mission ensuring the Marines get safely to their objectives.”

*Written by Cpl. Mackenzie Gibson, 2nd Marine Aircraft Wing at MCAS Cherry Point, N.C.* 🦅



## Navy Modernizes Tomahawk Weapons Control System

PATUXENT RIVER, Md.—After more than a decade in service, the Navy recently delivered an upgraded Tactical Tomahawk Weapons Control System (TTWCS) to the fleet.

The Tomahawk Weapons System Program Office has maintained the system since 2004 with incremental updates, but to ensure future viability, more significant hardware and software modernization was required.

“It is critical that the Tomahawk Weapons System evolves to meet warfighters’ needs,” said Capt. Mark Johnson, Tomahawk program manager. “The TTWCS upgrade ensures that it will remain effective against changing enemy threats.”

To prevent hardware obsolescence, the program office team replaced older systems with faster, more capable processors, updated software to increase cybersecurity and offered a simplified user interface.

Weapons Control System co-lead Lt. Cmdr. Paul Rotsch said updates to the interface were designed to streamline workflow and minimize potential for human error. Combined, the improved hardware and software increase the speed of engagement planning.

A hardware reconfiguration of workstations reduced the amount of space required to house equipment on a ship or submarine. Multiple systems can now be accessed from a



U.S. Navy photo

A Tomahawk Land Attack Missile is launched from an Arleigh Burke-class destroyer. Ships, including Arleigh Burke class-destroyers and nuclear-powered cruise missile submarines, will receive Tactical Tomahawk Weapons Control System hardware and software upgrades.

single workstation and other systems were condensed, freeing up space in control rooms.

The hardware improvements released to the fleet earlier this year will be incorporated on ships and nuclear-powered cruise missile submarines. Newly constructed Arleigh Burke-class destroyers will have a reduced TTWCS footprint incorporated into their design. All surface and subsurface platforms are slated to receive software upgrades. 🐦

## Mayport Named East Coast Base for Triton



NORFOLK—The U.S. Navy selected Naval Station (NS) Mayport, Florida, Feb. 15 as the East Coast forward operating base (FOB) for the unmanned MQ-4C Triton.

Mayport will be a permanent duty station for about 400 Triton personnel and will support rotational deployments outside the continental U.S. Facility construction will begin this year with the first Triton UAS scheduled to arrive in 2020.

Triton is an unmanned, unarmed, remotely controlled aircraft employed to enhance maritime intelligence, surveillance and reconnaissance data collection for the fleet, providing both tactical and

strategic mission capabilities as part of the U.S. Navy’s Maritime Patrol and Reconnaissance Force, headquartered

on the East Coast at Naval Air Station (NAS) Jacksonville, Florida.

Triton is a multi-sensor aircraft that is 48 feet long with a wingspan of 131 feet. The MQ-4C will conduct operations over water, with most occurring over international waters 12 miles or more offshore.

Triton uses a “remote split” operational concept, where mission crews are located at a main operating base (MOB) while air vehicles and maintenance personnel are located at a FOB. The East Coast Triton Unmanned Patrol Squadron (VUP) 19 MOB is based at NAS Jacksonville.

The Navy completed an environmental assessment (EA) that

analyzed the environmental impacts associated with establishing facilities and functions to support the East Coast home basing and maintenance of Triton at three potential locations—NS Mayport, NAS Key West and National Aeronautics and Space Administration (NASA) Wallops Flight Facility on the Virginia coast. The final EA identified no significant environmental impacts at any of the three sites.

Since there were no significant environmental impacts associated with any of the locations, the Navy’s decision was based primarily on its operational needs and its responsibility as a steward of taxpayer resources. Located in a fleet concentration area, NS Mayport provides the most operational, maintenance and family support for the least cost within its existing Navy facilities and services.

From U.S. Fleet Forces Command. 🐦

## MQ-8C Fire Scout Completes First Test Period Aboard LCS

PATUXENT RIVER, Md.—The Navy’s MQ-8C Fire Scout returned from USS Montgomery (LCS 8) April 11 after completing initial testing aboard a littoral combat ship.

The Fire Scout test team, along with Navy Sailors aboard Montgomery, conducted dynamic interface testing to verify the MQ-8C launch and recovery procedures and test interoperability between the unmanned helicopter and the ship.

“This testing is critical, as it provides the flight envelope to safely execute MQ-8C flights from this class of ship,” said Richard Gorman, Fire Scout lead assistant program manager for test and evaluation. “This test puts the MQ-8C one step closer to successfully deploying aboard the Navy’s fleet of littoral combat ships.”

The team conducted more than 37 recovery evolutions over seven days to verify Fire Scout’s capability to operate without degradation from electromagnetic interference, as well as provide pitch, roll and wind limits.

“This test established the MQ-8C Fire Scout as a maritime platform, bringing superior endurance and payload flexibility to the fleet, bringing capability that the U.S. Navy will continue to use for many years to come,” said Capt. Jeff Dodge, Fire Scout program manager.

The MQ-8C is a larger variant than the MQ-8B and provides longer endurance (eight hours on station), range



U.S. Navy photo

*The MQ-8C Fire Scout unmanned helicopter conducts first test flight from USS Montgomery (LCS 8) April 5.*

(150 nautical miles) and greater payload capability (700 pounds). The Navy will begin initial operational test and evaluation in fall 2017.

Fire Scout complements the manned MH-60 helicopter by extending the range and endurance of ship-based operations. It provides unique situational awareness and precision target support for the Navy with its ability to detect, identify, track and potentially engage threats at extended ranges while supporting maritime requirements across the range of military operations. ✈️

## U.S. Marine Corps Receives Approval for CH-53K King Stallion Production

NATIONAL HARBOR, Md.—The U.S. Navy received Pentagon approval April 4 to begin production of the CH-53K heavy-lift helicopter.

“We have just successfully launched production of the most powerful helicopter our nation has ever designed,” said Col. Hank Vanderborcht, U.S. Marine Corps program manager for the Naval Air Systems Command’s Heavy Lift Helicopters program, (PMA-261). “This incredible positive step in capability is going to revolutionize the way our nation conducts business in the battlespace by ensuring a substantial increase in logistical throughput into that battlespace. I could not be prouder of our government-contractor team for making this happen.”

Production is expected to begin in June at Sikorsky’s facility in Stratford, Con-

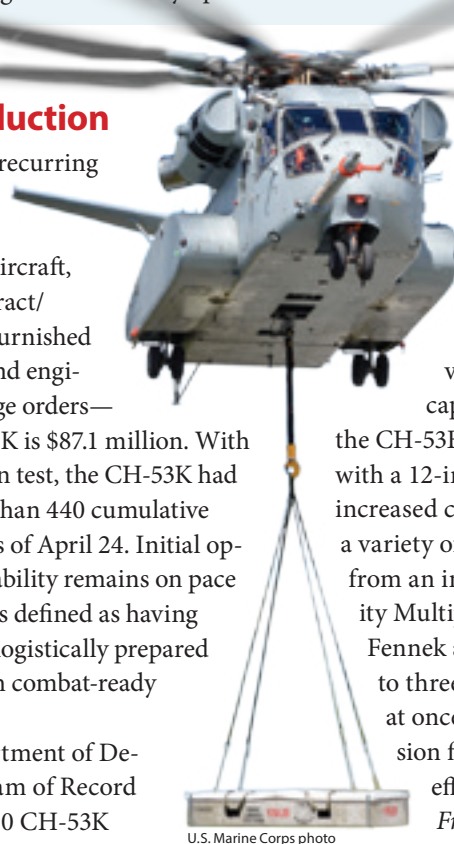
necticut. The recurring flyaway unit cost—which includes the aircraft, engines, contract/government furnished equipment, and engineering change orders—for the CH-53K is \$87.1 million. With four aircraft in test, the CH-53K had logged more than 440 cumulative flight hours as of April 24. Initial operational capability remains on pace for 2019 and is defined as having four aircraft logistically prepared to deploy with combat-ready crews.

The Department of Defense’s Program of Record remains at 200 CH-53K

aircraft. The Marine Corps intends to stand up 10 squadrons—eight active duty, one training and one reserve.

The King Stallion provides three times the heavy-lift capability of its predecessor, the CH-53E Super Stallion. Coupled with a 12-inch wider internal cabin, this increased capacity can take the form of a variety of relevant payloads ranging from an internally loaded High Mobility Multipurpose Wheeled Vehicle or Fennek armored personnel carrier, up to three independent external loads at once, providing incredible mission flexibility and system efficiency.

*From PEO(A) Public Affairs.* ✈️



U.S. Marine Corps photo



## U.S. Pacific Fleet Commander Soars as New Gray Eagle

WASHINGTON—Commander, U.S. Pacific Fleet, Adm. Scott Swift, received the Gray Eagle award in honor of being the most senior naval aviator on active duty. The award was presented March 1 during an aviation breakout session at the Navy Flag Officer and Senior Executive Symposium here.

The Gray Eagle award recognizes Swift's 38 years of naval service having flown the A-7E Corsair II and F-18C Hornet, while also leading at various levels of Naval Aviation and throughout the Navy.

"I'm not sure that 'Most Ancient Aviator' is how I want to be remembered by Naval Aviation," joked Swift. "Part of me suspects that this plaque was written by junior officers to not so subtly hint that the admiral needs to stay off the flight schedule and leave the flight hours to them."

"In all seriousness, I'm honored to be named the Gray Eagle, and to help celebrate the history and heritage of Naval Aviation," remarked Swift. "From Aviator #1, 'Spuds' Ellyson, to the brave pilots that fought to victory 75 years ago at Coral Sea and Midway, to our young student naval aviators in the training pipeline today, naval aviators continue to serve our Navy and our nation with pride, distinction and a healthy respect for the untiring laws of gravity. I am honored to still count myself among this august group."

The Gray Eagle award is a trophy that resembles an eagle landing on the deck of the Navy's first aircraft carrier, USS Langley (CV 1). The award was presented to Swift by Chief of Naval Operations Adm. John Richardson. The former Gray Eagle award holder was Adm. (ret.) Bill Gortney, who held the award from October 18, 2014, until March 1, and, was on hand to help pass along the award. "It was an honor and a privilege to serve as the Gray Eagle, even more so being a naval aviator in our great Navy," said Gortney. "I miss the people and the mission. Adm. Swift will do great as my relief! Fly safe, be lethal!"



U.S. Navy photo

Adm. Scott Swift, left, commander, U.S. Pacific Fleet, receives the Gray Eagle award from Chief of Naval Operations Adm. John Richardson, center, and the previous recipient, retired Adm. Bill Gortney.

In 1960, Chance Vought Aircraft, Inc., now Northrop Grumman Corporation, proposed the trophy design with the inscription "In recognition of a clear eye, a stout heart, a steady hand and a daring defiance of gravity and the law of averages." The name of each recipient and the dates of the title the award was held are also engraved on the trophy.

The senior Navy or Marine Corps aviator maintains the title of Gray Eagle until the member retires and a new recipient is named from the official precedence list of prospective Gray Eagles, maintained by the Office of the Chief of Naval Operations.

*From Commander Naval Air Forces Public Affairs.* 🦅



U.S. Marine Corps photo by Lance Cpl. Clare J. Shaffer

## Hot Load Exercise

U.S. Marines with Marine Fighter Attack Squadron (VMFA) 211 conduct a hot load exercise in support of Weapons and Tactics Instructor Course 2-17 at Yuma Proving Grounds, Ariz., April 13. 🦅



# Future USS Ford Completes Builder's Sea Trials

*By Naval Sea Systems Command Public Affairs*

The future USS Gerald R. Ford (CVN 78) remains on track for acceptance trials and delivery to the U.S. Navy this spring following completion of her initial set of sea trials—known as builder's sea trials—April 14. Builder's sea trials provide an opportunity to test systems, components and compartments at sea for the first time.

**“G**erald R. Ford returned successfully from builder's trials and she is a spectacular fighting machine,” said Rear Adm. Bruce Lindsey, commander, Naval Air Force Atlantic. “Among her many advancements, the new launch and recover equipment designed into Gerald R. Ford will allow the carrier to operate with future aviation platforms that are either lighter or heavier than those found in today's air wing. She, along with her future air wing, will provide any president and secretary of defense all the





U.S. Navy photo by Matt Hildreth courtesy of Huntington Ingalls Industries

gravitas required to reach lasting and peaceful accords for the next 50 years.”

Ford arrived for the first time at her homeport of Naval Station Norfolk, Virginia, following seven days at sea, during which her crew—along with representatives from Huntington Ingalls Industries-Newport News Shipbuilding, the CVN 78 Program Office, the Navy’s Supervisor of Shipbuilding, Conversion and Repair, and various technical subject matter experts—demonstrated many of the ship’s capabilities, including tracking aircraft with the dual band radar, conducting “no load” cycles using the new electromagnetic aircraft launch system (EMALS), and performing small boat operations. She also completed high power runs, steering evolutions and all ahead flank turns.

The Navy and shipbuilder learned a great deal about the ship’s performance

during the extensive testing. Analysis continues, and any identified corrective actions will be addressed.

“As with any new class of ship, the builder’s trials allowed the engineers to actually observe how the new design operates in the envisioned environment and they learned a lot,” Lindsey said. “But more importantly, the crew of the Gerald R. Ford operated the ship under numerous

configurations, gaining valuable hands-on experience that only underway operations enable; everything from putting the rigid-hull inflatable boat into the water to simulate a rescue-at-sea to operating anti-submarine warfare equipment and tracking airborne aircraft. Even the sea and anchor detail that took the ship out and back into port was a valuable operational experience for the captain and the crew.” 🚢

### Ford Provides Medevac

While underway April 11, Ford was the closest available responder when a Sailor on dock landing ship USS Oak Hill (LSD 51) required medical evacuation. An embarked MH-60S Seahawk from the “Sea Knights” of Helicopter Sea Combat Squadron (HSC) 22 flew the Sailor to Navy Medical Center Portsmouth, Virginia, where he was treated and released.

“We got the word, coordinated the necessary permissions, and were off-deck shortly thereafter,” said Cmdr. Jody Smotherman, Ford’s combat direction center officer. 🚢

# Nimitz Strike Group Ready for Deployment

*By MC2 Holly L. Herline*

The USS Nimitz (CVN 68) Carrier Strike Group (CSG) 11 completed its final pre-deployment assessment, Composite Training Unit Exercise (COMPTUEX), April 21, successfully concluding its condensed inter-deployment training cycle.

U.S. Navy photo by MC Cole Schroeder

**C**OMPTUEX tests a strike group's ability to work and operate as one cohesive unit in a simulated, real-world, scenario-based training environment.

Vice Adm. Nora Tyson, commander, U.S. 3rd Fleet, said, "COMPTUEX is designed to put a strike group through the highest level of training that we can possibly give. This allows them to go forward around the world and do anything that our country would ask them to do."

Throughout the exercise, the strike group, joined by Destroyer Squadron 9 and Carrier Air Wing 11, encountered an environment that mirrored, as closely as possible, what it may encounter while deployed in future areas of operation.

"Considering that the past five weeks have been the first time that the Nimitz CSG has trained together at sea in more than three years, we did extremely well," said Rear Adm. Bill Byrne, commander, CSG 11. "We did a lot of high velocity learning."

During COMPTUEX, Nimitz became the first CSG to implement the use of the fleet warfighting training system live, virtual, constructive (LVC) training concept. LVC allows for the synthetic virtual environment to be integrated with the live environment, providing more comprehensive and realistic training.

LVC can create scenarios that involve higher complexities and stress the strike group to its max capabilities, leading to more proficient, prepared strike groups and fighting forces.

COMPTUEX was broken into two separate phases: Phase I closely followed a schedule of events that acted as a training phase for Sailors and watchstanders. Phase II gave the strike group an unscheduled, more realistic scenario.

"Some of it might be in a synthetic environment, some is live, but overall, it is designed to really challenge the strike group," Tyson said. "This is so that, from Rear Adm. Byrne to the youngest Sailor on the deck plates, everyone feels confident that if you have to go into any scenario where you are tested to the highest end of your capability, you will be able to comfortably go and succeed."

Sailors said COMPTUEX challenged them.

"I believe the training was invaluable," said Cryptologic Technician (Technical) 2nd Class Traci Allen, Combat Systems' Electronic Warfare Module supervisor. "We finally got the chance to work with our whole strike group and figure out our battle rhythm. The experiences we gained will follow us over the horizon when we take to open water. Nothing and no one can take that away from us."





*Aviation Structural Mechanic (Safety Equipment) 2nd Class Ryan O'Neil, left, and Aviation Structural Mechanic 3rd Class Miguel Laureanogaribaldi launch an F/A-18E Super Hornet off the flight deck of aircraft carrier USS Nimitz (CVN 68) April 8 as part of its Composite Training Unit Exercise (COMPTUEX) with Carrier Strike Group 11 in the Pacific Ocean.*



U.S. Navy photo by MC Cole Schroeder

*Sailors move ordnance aboard USS Nimitz (CVN 68) April 13 during its COMPTUEX with the CSG 11 in preparation for an upcoming deployment.*



U.S. Navy photo by MC Leon Won

*Aviation Electronics Technician 1st Class Michael Popp performs maintenance April 17 on an F/A-18E Super Hornet aboard USS Nimitz (CVN 68) during its recent COMPTUEX with CSG 11.*



U.S. Navy photo by MC Leon Won

*Naval Air Crewman (Helicopter) 2nd Class Joshua Martinez performs a final check April 9 on an MH-60S Seahawk helicopter on the flight deck of USS Nimitz (CVN 68).*

Rear Adm. Ross Myers, commander, CSG 15, and his staff acted as the grading entity for COMPTUEX. They observed the Sailors aboard Nimitz and throughout the strike group as they reacted to scenarios they may face on deployment and determined their proficiency to operate in a real-world environment.

"CSG 15, our trainers and assessors, presented an enemy and warfighting environment that was both relevant and realistic," Byrne said. "This is the best training scenario I've seen in my 30 years of working these types of battle problems. That sort of competitiveness, initiative and toughness I saw across the strike group is exactly what the Chief of Naval Operations asks of us."

With the completion of COMPTUEX, the Nimitz CSG is now fully certified to deploy later this year.

"We are going to be tested. We need to go forth confident that we will be competitive enough and that we will be tough enough to prevail. I have no doubt that Nimitz Strike Group is both," Byrne said.

*Mass Communication Specialist 2nd Class Holly L. Herline supports USS Nimitz (CVN 68) Public Affairs.* 🦅



# PRODUCING READY, RELEVANT LEARNING FOR SAILORS

*By Andrea Watters and Mikel Lauren Proulx*

The Naval Air Warfare Center Training Systems Division (NAWCTSD) is a key stakeholder in leading the CNO's Ready, Relevant Learning (RRL) initiative to deliver training at the right time, in the right place and in the right format for today's Sailors.

**R**RL is one of three aspects of the CNO's Sailor 2025 Vision of the 21st century Sailor, which also includes modernizing the personnel system and enriching the culture. All three aspects are designed to work in tandem to give Sailors what they need to succeed.

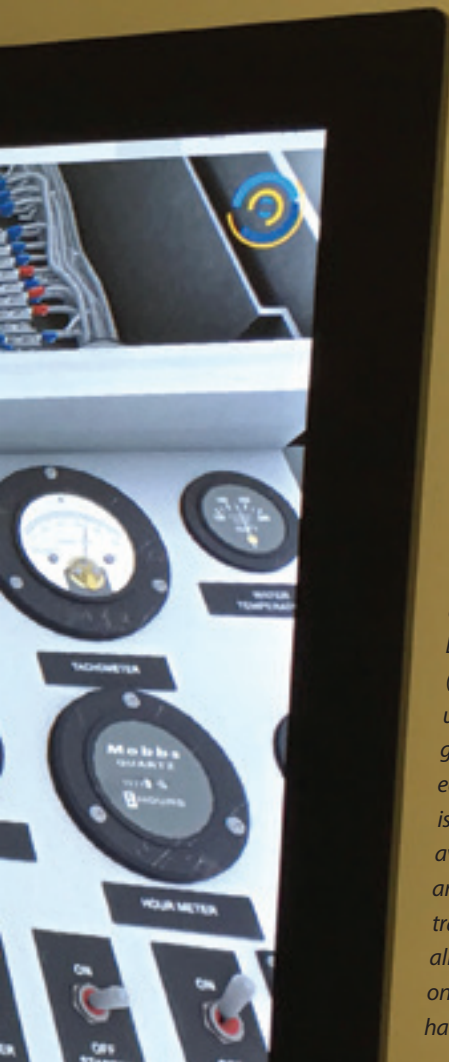
"The long-term vision is to offer all Navy training in the Ready, Relevant Learning model, which will become the

new norm, backed by repeatable processes, new standards and proven results," said Eric Pfefferkorn, program manager for RRL at NAWCTSD in Orlando, Florida.

In support of Sailor 2025, NAWCTSD operates under the authority and direction of the executive agent, U.S. Fleet Forces Command.

With today's focus on innovation and critical thinking, some traditional training methods are being re-evaluated.





*A Sailor uses the Multipurpose Reconfigurable Training System 3D® as he trains on the Mobile Electric Power Plants (MEPP) system used to maintain ground support equipment. MEPP is the first of many aviation operations and maintenance training applications, all of which can run on a common set of hardware.*

U.S. Navy photo

“Right now, we train Sailors early in their careers and, just like all of us, they forget a lot of that training because they don’t use it; they don’t have a need to use it until, perhaps, six, seven, eight years down the road. Then we need to refresh that training for them,” said Vice Adm. Paul Grosklags, commander, Naval Air Systems Command.

“RRL is a transformational Navy training initiative that will accelerate the learning of every Sailor for faster response to our rapidly changing warfighting requirements. A major goal is to achieve higher performance by coupling the timing of training delivery with every Sailor’s actual deck plate need. RRL will ensure every Sailor receives modernized training at the point of need to support assigned tasking through a phased approach starting with accession ‘A’ and ‘C’ schools,” Pfefferkorn said.

The transition begins with modernizing the courses taught in the Navy’s traditional

## ***Fleet to Receive Transportable Jet Simulation Trainers***

The days of Marines walking into the ready room on their ship and seeing a make-shift AV-8B Harrier cockpit—with its controls, buttons and knobs drawn on whiteboards surrounding a “pilot” chair—are numbered thanks to a new training device.

In August, the Naval Aviation Training Systems Program Office (PMA-205) entered into an \$8.4 million procurement contract with Logistics Services International Inc. of Jacksonville, Florida, to provide eight transportable AV-8B cockpit simulation trainers inclusive of radar operation, hand-on-throttle-and-stick operation, heads-up and multi-color display, and control monitor set functionality. The first deployable mission trainers are expected to be delivered to the fleet in July 2018.

These first-of-their-kind Deployable Mission Rehearsal Trainers (DMRTs) will provide pilots with critical training when they are deployed to forward areas or aboard a ship, said Brian Trago, Marine Corps AV-8B training systems integrated product team lead.

“The deployable nature of these devices will allow AV-8B pilots to take their safe, simulated training environment with them,” Trago said. “In doing so, pilots will have the ability to continue to train the way they will fight versus training while they are fighting.”

The importance of the DMRT can’t be overstated, Trago said, expanding on the increased safety the trainer will provide.

“In addition to being a safe, no-risk environment for our pilots, ground-based simulated training is a fraction of the cost of flying,” he added.

Marine Corps Aviation Training Systems lead Anthony Singleton said the DMRT will improve current situations in which deployed pilots draw up the aircraft’s cockpit layout on whiteboards surrounding a chair to practice and train for upcoming missions.

“The DMRT advances that concept,” Singleton said. “It is comprised of a simulated out-the-window view with flat screens depicting the cockpit’s displays, buttons, knobs and switches, which the pilots will be able to virtually utilize, along with a mock AV-8B cockpit seat, stick and throttle.”

*Written by Amanda Scott, who provides communication support to the Naval Aviation Training Systems Program Office.* ✈️



Rendering courtesy of Logistics Services International Inc.

# MODERNIZING TRAINING



*Sailors learn together  
on the Mobile  
Electric Power  
Plants Multipurpose  
Reconfigurable  
Training System 3D®.*

U.S. Navy photo

*“To help determine how training content is converted, TSD and industry partners are using current science of learning, human performance support strategies and distributed learning in virtualized, mobile and Navy training enterprise systems.”*

accession schools for more than 70 enlisted ratings. Ratings are the jobs enlisted Sailors perform, and these designations follow Sailors throughout their careers building a sense of pride and community. The rating names have been an integral part of the Navy for more than 241 years; so much so that in December CNO Adm. John Richardson reversed the decision, made three months earlier, to replace the ratings system with a Navy Occupational Specialty Code. While ratings have returned, the Navy still intends to modernize the rating program.

The first eight ratings scheduled for conversion to RRL are aviation electrician's mate (AE), cryptologic technician maintenance (CTM), logistics specialist (LS), logistics specialist submarine (LSS), quartermaster (QM), operations specialist (OS), sonar technician surface (STG) and sonar technician submarine (STS).

To help determine how training content

is converted, NAWCTSD and industry partners are using current science of learning, human performance support strategies and distributed learning in virtualized, mobile and Navy training enterprise systems.

“We are looking at how a Sailor learns, what they need to learn, when they need to learn it, and the best way to deliver the learning content,” Pfeifferkorn said.

Accession schoolhouse content is the focus of the first phase of curriculum content conversion, and 100 percent of those learning objectives will be evaluated for conversion. Relying on technical documentation, instructors and fleet subject matter experts, NAWCTSD is capturing the knowledge and skills that Sailors learn in schools to develop, implement, integrate, test and evaluate and deliver modernized training content.

The Navy's “A” schools are considered



## ***UAV 'Wingman' Technology Used in Air Combat Trials***

WASHINGTON—Navy and Air Force research labs are collaborating on cross-platform coordination of manned and unmanned air combat teams to operate in highly contested environments.

The Naval Research Laboratory (NRL)-developed tactical battle manager (TBM) software allows a human operator to manage the unmanned aerial vehicles (UAVs) on a team by coordinating their objectives and goals.

The Navy Center for Applied Research in Artificial Intelligence (NCARAI) at NRL, Naval Air Systems Command (NAVAIR) and the Air Force Research Laboratory (AFRL) joined forces to continue work on the TBM, which uses intelligent agents to guide the UAVs, which each serve as a "wingman" in manned/unmanned teams in simulated beyond-visual-range air combat missions.

In these scenarios, operators control the lead air vehicle and communicate with autonomous agents controlled by TBM. Each agent observes its environment through its sensors and executes actions to achieve its goals. These agents employ goal reasoning techniques, allowing them to dynamically self-select mission objectives to pursue. This ensures competent behavior when the operator is inaccessible and unanticipated situations arise, for example, representing challenges or opportunities.

"The main idea here is if the UAV/wingman is left to its own devices, it has the ability to recognize when or how to change

its goal or objective as the mission scenario unfolds," said David W. Aha, head, adaptive systems section, NCARAI. "While some systems allow users to insert new goals or pre-program the selection of new goals, goal reasoning agents can dynamically select new goals to pursue that are not pre-programmed."

NRL's team integrated the TBM with the Air Force's Analytical Framework for Simulation, Integration and Modeling (AFSIM) and NAVAIR's Next Generation Threat System. Both are high-fidelity, beyond-visual-range mission simulators modeling air, land and surface platforms, including weapons and subsystems, and are used daily by pilots in virtual training and testing systems.

Aha said in initial human studies with AFSIM, in counter-air scenarios, expert pilots said they had a positive attitude for trusting the tactical battle manager's ability to control a UAV under their command.

TBM development occurred within the framework of the Office of the Secretary of Defense-sponsored project Autonomy for Air Combat Missions, one of five multi-service research projects on autonomy technology involving NRL researchers. NRL's intelligent agent for controlling unmanned vehicles is being used by AFRL and NAVAIR in simulated beyond-visual-range air combat scenarios.

*Written by Daniel Parry, U.S. Naval Research Laboratory Public Affairs.* 

basic operator and, in some cases, basic maintenance training for each rating, and "C" schools are the Navy's advanced training schools. Depending on the rating, both schools can range from several weeks to more than a year.

"Our collaboration with schoolhouse instructors and fleet subject matter experts is critical to success," Pfefferkorn said. Fleet subject matter experts are representatives of the Sailors in a particular rating.

Another key component of RRL is identifying when Sailors need to learn new information or skills during their careers. Pfefferkorn's team is looking closely at a Sailor's career progression and asking what he or she needs to know at any given time during their career. "A machinist mate doesn't necessarily need to learn how to conduct a diesel engine inspection during his or her first tour, but does need to qualify to safely operate the diesel," he said.

"Once we know how, what and when, we

can determine the most effective means of delivering that training," Pfefferkorn said.

"During one of the steps in NAWCTSD's process—the media and fidelity analysis—media pool characteristics are refined to ensure high training effectiveness while minimizing cost impacts. The most appropriate delivery methods for each learning objective are then narrowed down and the best delivery method is chosen," he said.

"This could be on a tablet, it could be in a virtual environment, by themselves or with other Sailors or Marines. It could be in a schoolhouse at the end of the pier or in the squadron environment. I believe it is going to be a combination of all of those things and probably some things we haven't thought about yet," Grosklags said.

One potential solution may be a pier side electronic classroom with 20 computers configured to train electrician's mates one day and fire control technicians the next, Pfefferkorn said.

## **Non-Traditional Content Delivery**

NAWCTSD has already developed a non-traditional learning model called the Multipurpose Reconfigurable Training System 3D® (MRTS 3D®).

The MRTS 3D laboratories and classrooms operate government-owned simulation software run on a network of commercial-off-the-shelf computer hardware with the tactical equipment, such as a torpedo room, simulated in a physics-based video game engine, said David Williams, deputy director, Undersea Programs at NAWCTSD. The MRTS 3D suite can switch between multiple simulation applications within minutes, providing photo-realistic, virtual training for several systems. Students follow shipboard procedures and operating manuals, interacting with the simulated equipment through intui-

# MODERNIZING TRAINING

*“The MRTS 3D suite can switch between multiple simulation applications within minutes, providing photo realistic, virtual training for several systems.”*

tive touchscreen commands and gestures such as turning valves and selecting tools for the job.

“MRTS 3D is a great example of training outside the traditional classroom. The training still requires instructors, but does not necessitate an entire building full of classrooms and associated infrastructure,” Pfefferkorn said.

“One of the highly effective aspects of the MRTS 3D training solutions is that it can be aligned for individual training, where every student has their own independent simulation, or the hardware can be rearranged to simulate a larger system for team training,” Williams said.

For example, one MRTS 3D lab could be used to simulate 24 independent MRTS 3D Mobile Electric Power Plants (MEPP), wherein each student is reacting to different casualties as set by the instructor. The MRTS 3D touchscreens could then be reconfigured to simulate an aircraft carrier’s “bubble,” flight deck, and equipment spaces for team launch and recovery operations.

“The fielded products are currently stand-alone training systems, but there are a variety of initiatives being examined for how best to include the MRTS 3D products into RRL and other Navy plans,” Williams said.

The MRTS 3D MEPP is the first of many aviation operations and maintenance training applications, all of which can run on a common set of hardware.

NAWCTSD is in the early development stages for the MRTS 3D MQ-4C Triton avionics maintenance trainer, and other aviation support equipment for the aviation support equipment technician (AS) is planned over the next several years.

Other aviation applications in the works include an operational and maintenance simulation of the Ford-class aircraft carriers’ next generation catapult system, the Electromagnetic Aircraft Launch System (EMALS). This training system will be used for several different aviation ratings, saving funds compared to producing single-purpose trainers for each technical rate.

*Andrea Watters is editor of Naval Aviation News magazine, and Mikel Lauren Proulx is the Visual Information Department lead at Naval Air Systems Command.* 🦅

*Sailors work on individual scenarios as they train on the Mobile Electric Power Plants Multipurpose Reconfigurable Training System 3D® developed at Naval Air Warfare Center Training Systems Division in Orlando, Fla.*



U.S. Navy photo by



*Fleet Anti-Submarine Warfare Training Center (FLEASWTRACEN) instructor Sonar Technician (Surface) 1st Class Brennan Lukas teaches Sonar Technician (Surface) Seaman Apprentices David Gonzalezpineda and Adam Yates attack procedures to fire the MK 46 torpedoes on the MK 116 Fire Control console during a lab at the training center.*



U.S. Navy photo by ST2 Vaughn Hardge



U.S. Navy photo by Matt Mogle

*Instructor Operations Specialist 2nd Class Jordan M. Monroe goes over the Basic Ships Self Defense System console operations with Operations Specialist Seaman Recruit Francesca G. Frontera during a simulation of underway strike group operations at Operations Specialist "A" School, Center for Combat Systems Unit, Great Lakes, Ill.*

## ***Logistics Specialist Rating Kicks off Block Learning***

Naval Technical Training Center Meridian's Logistics Specialist (LS) Course convened the first delivery under the new block learning construct, April 17, marking a major milestone in the transformation to Ready Relevant Learning (RRL).

The first group of Sailors to participate in the new block learning construct are new accession logistics specialists who just completed recruit training. The new course, referred to as Block 0, focuses on the basics of afloat and aviation logistics, to include procurement and inventory management, as well as the documents and directives required to perform these tasks.

The new curriculum removed the postal clerk portion of the training and shortened LS "A" school by seven training days, which ultimately gets Sailors to the fleet faster. LS Sailors on first operational tours who actually perform postal clerk duties will receive the postal clerk training, referred to as Block 1, no later than 24 months (in most cases) after arrival at their operational unit to align this specific training to the point of need—one of the major goals of RRL.

Block learning is the first step in the RRL transformation to a lifelong learning continuum for these Sailors. Training will only be delivered to students who require it for the billet that they are

going to fill, thereby minimizing the amount of time required to train to only that which is mission relevant and enhances fleet readiness.

"Sailors receiving instruction in this new manner will be delivered to the fleet armed with the most current knowledge available to perform their jobs at a high level," said Capt. Derric Turner, commanding officer, Center for Service Support (CSS). "I'm very proud of our civilians, Sailors and contractors that contributed to this process."

"This course is the culmination of years of work and countless man-hours from training managers and instructional support specialists here at CSS, instructors at the schoolhouse, and input from the fleet to tailor the individual learning objectives to meet the needs of new Sailors assigned to the LS rating," said Chief Logistics Specialist Bonita Myers, LS training manager.

CSS is comprised of active-duty, civilian and contractor personnel who direct the training efforts of administration, logistics and media schools for active-duty and commissioned officers. The CSS team ensures curriculum and professional development tools are current.

*From Center for Service Support Public Affairs.* 🇺🇸



# MODERNIZING TRAINING







# Marines Gain Critical Hands-On Experience Swapping F-35B LiftFan at Sea

By MC1 Benjamin Woody

U.S. Marines successfully removed and replaced an F-35B Lightning II LiftFan for the first time at sea aboard amphibious assault ship USS America (LHA 6) during the short-takeoff-and-vertical-landing (STOVL) variant's third and final shipboard developmental test phase in November.

**T**he F-35 Lightning II Patuxent River Integrated Test Force from Air Test and Evaluation Squadron (VX) 23 and personnel from Lockheed Martin observed as the Marine Operational Test and Evaluation Squadron (VMX) 1 Marines tested the LiftFan removal and replacement process. Prior to embarking America, the VMX-1 maintainers leveraged their experience in legacy AV-8B Harrier and F/A-18 Hornet squadrons while learning and testing land-based F-35B maintenance procedures.

As they conducted the first LiftFan swap at sea, the Marines accounted for and tracked each step of the process by entering the individual maintenance steps into ALIS, the Autonomic Logistic Information System, which equips personnel with the ability to plan ahead, maintain and sustain F-35 subsystems over the life of the aircraft.

Testing the ability to swap entire engines, engine components and LiftFans at sea proved the shipboard maintenance construct and provided critical hands-on experience dealing with the confined space and deck motion aboard ship—vital elements that cannot be replicated ashore.

Their testing also refined and improved the procedures, ensuring efficiency of future training and maintenance actions by fleet maintainers.

*Mass Communication Petty Officer 1st Class Benjamin Woody is a member of USS America's Public Affairs team.* 🇺🇸

U.S. Navy photo by Kyle P. Hafer

# HSC-25 Expedites Multi-System Qualifications Using High Velocity Learning

By Lt. Cmdr. Matthew Mravlja and AFCEM (AW/SW) Edgar A. Delacerda

Meeting ongoing maintenance requirements is a current and historical challenge many aviation squadrons in the U.S. Navy face. This can be further compounded during high-tempo periods, when “being qualified” usually means a greater individual workload, which can impact other Sailors’ desires to get qualified.

To address this challenge, the “Island Knights” of Helicopter Sea Combat Squadron (HSC) 25 at Anderson Air Force Base, Guam, took a page out of the CNO Adm. John Richardson’s “A Design for Maintaining Maritime Superiority,” specifically the “Achieve High Velocity Learning at Every Level” section (see sidebar).

First, we established a syllabus that was executable, repeatable and adhered to a realistic timeline to allow Sailors of one rate to achieve qualifications in another—known as multi-system qualification. Our second goal was to minimize qualification time for members checking in with little or no experience on the type/model/series. A working team was established, comprised of quality assurance officer Lt. Jake Dighton, aircraft division officer Lt. Kevin Marshall and aircraft division leading chief petty officer Senior Chief Senh Phu.

The instructions were straightforward—using the tenets of high velocity learning, develop a plan to achieve the objectives listed. After 10 days the team presented a rough outline, and a week later, a finished product. Emphasis was placed on identifying which rate could transition to another with the greatest efficiency and fewest restrictions. For example, aviation

electrician’s mates (AEs) and aviation machinist mates (ADs) have multiple areas of overlap, making it easier to tailor a syllabus for AEs to achieve an AD qualification and vice versa. In total, six syllabi were developed covering multiple combinations for achieving multi-system qualifications, all of which adhered to the requirements established by the governing maintenance instructions.

From a group of Sailors already qualified in their respective rates as collateral duty quality assurance representatives (CDQAR), four volunteers—two AEs, an AD and two aviation structural mechanics (AMs)—were selected as initial participants.

They were assigned to the phase maintenance team and provided a syllabus that would allow them to achieve CDQAR in another rate within six-to-nine months. Along with routine and rigorous self-assessment, the mutual mentorship the four volunteers provided each other was a key element of the process. Reviews were conducted every 30 days, with metrics including syllabus completion rate, problem areas and lessons learned.

After three months with the multi-system qualification plan in place, results following the first review were telling.



U.S. Navy photo by LS2 (AW) Jordan Rose

As expected, mechanical rates looking to achieve an additional qualification in another mechanical rate showed greater progress than, for example, an electrical rate attempting to qualify in a mechanical rate. Also, identifying previously rate-qualified personnel and immediately starting them on the syllabus provided more return on our investment than beginning later in their tour.

Prioritizing requirements also impacted progress. In the case of one AM, the Maintenance Department made achieving the phase coordinator qualification a higher priority than attaining an additional system qualification.





U.S. Navy photo by LS2 (AW) Jordan Rose

*AD2 Alex Bolivar and AMAN Alexander Crawley, members of HSC-25's Phase team, complete a bleed and service of the tail strut on aircraft Knight Rider 11.*



*AM2 Szilvia Toth reviews procedures before performing phase maintenance on Knight Rider 11.*



U.S. Navy photo by LS2 (AW) Jordan Rose

*Phase team member AE2 Devon Green completes maintenance on components of the blade fold system.*

The process did come with challenges, and is an ongoing effort to balance maintaining a specific timeline for achieving “bonus” qualifications while adjusting to operational commitments here in Guam.

Also, days after we implemented the process, a rewrite of the Naval Aviation Maintenance Program (NAMP) hit the streets. This had an immediate impact on our Sailors’ qualification process, the greatest being on maintainers who had not completed 75 percent of their on-the-job-training assignment and were forced to restart with a syllabus aligned with the new policies—two of HSC-25’s maintainers had to essentially start over.

The Island Knights also identified delays in the syllabus when scheduling required schooling that could not be completed on Guam.

Even with these issues, the results have been promising.

We have two maintainers above the established glide slope and three slightly below but well on their way to achieving multi-system qualification. We have established a process that accomplishes critical maintenance while furthering our Sailors’ professional development.

Lastly, we have created a workable feedback/review process that allows us to monitor progress while improving pro-

## CNO Adm. John Richardson’s “A Design for Maintaining Maritime Superiority”

### Achieve High Velocity Learning at Every Level

Apply the best concepts, techniques and technologies to accelerate learning as individuals, teams and organizations. Clearly know the objective and the theoretical limits of performance—set aspirational goals. Begin problem definition by studying history—do not relearn old lessons. Start by seeing what you can accomplish without additional resources. During execution, conduct routine and rigorous self-assessment.

Adapt processes to be inherently receptive to innovation and creativity.

1. Implement individual, team and organizational best practices to inculcate high velocity learning as a matter of routine.
2. Expand the use of learning-centered technologies, simulators, online gaming, analytics and other tools as a means to bring in creativity, operational agility and insight.
3. Optimize the Navy intellectual enterprise to maximize combat effectiveness and efficiency. Reinvigorate an assessment culture and processes.
4. Understand the lessons of history so as not to relearn them. 🦋

cedures. The implementation of the high velocity learning concepts and techniques has proven crucial to our initial success.

While one data point does not make a trend, the HSC-25 maintenance department is equipped and ready to continue providing quality aircraft to our flight crews, and incorporating high velocity learning will improve our squadron, the HSC community and Naval Aviation capabilities and talents.

*Lt. Cmdr. Matthew Mravlja and Master Chief Aircraft Maintenceman (Air Warfare/Sea Warfare) Edgar A. Delacerda are members of Helicopter Sea Combat Squadron (HSC) 25. 🦋*

# CMV-22B Osprey Completes F-35's Golden Mile

*By Cmdr. Sam Bryant, Lt. Col. Mark Woodard and Randle Tolliver*

With deployment of its F-35 Lightning II variant fast approaching, the Navy-Marine Corps team is working hard to bring another aircraft program online with a key enabling capability to the F-35's success—delivering its immense engine to ships at sea.

In addition to increased flexibility and cargo capacity, the U.S. Navy's next carrier onboard delivery (COD) platform, the CMV-22B Osprey, will allow the service to clear the final hurdle in its logistics support of the F-35C, the Navy's Lightning II variant.

The Navy first delivered an aircraft engine at sea in June 1958, when a TF-1 Trader—redesignated as C-1A in 1962—conveyed an F2H-3 Banshee jet's Westinghouse J34 turbojet engine 300 miles to sea to USS Yorktown (CV 10). Ever since, it has been an enduring requirement that COD aircraft be able to transport aircraft engines and components on the last and most critical leg of their journey—the carrier air wing (CVW) at sea. Because this final leg can only be completed by a carrier-based aircraft, neither the Air Force nor commercial services can close this final link in the supply chain from shore to ship at sea—known as the “golden mile.”

In 1962, when the Navy decided to buy a COD derivative of its new Airborne Early Warning aircraft, the E-2 Hawkeye, the need for long-range transport of aircraft engines and other large components led to an expanded fuselage and the addition of a rear loading ramp. The resulting aircraft,

the C-2 Greyhound, debuted as the Navy's new COD platform in 1965 and has served in that capacity ever since.

Though the F-35 will add significant combat potential to Navy and Marine air wings, its engine has presented significant challenges in providing at-sea logistics support. Both the Marine's F-35B and Navy's F-35C variants use the Pratt & Whitney F135 engine, but its power module—at 9,350 pounds when inside a storage container, it is the engine's heaviest and bulkiest component—is both too heavy for smaller vertical replenishment (VERTREP) platforms such as the MH-60 helicopter, and too large to fit inside the C-2, leaving the only options being a heavy VERTREP with a H-53 or V-22. In addition, the power module's weight exceeds the underway replenishment (UNREP) capability of amphibious assault ships and all carriers except USS Abraham Lincoln (CVN 72) and USS George Washington (CVN 73), which are both planned for a heavy UNREP upgrade.

With the first deployment of the F-35B—scheduled for fiscal 2018—providing a sense of urgency, the Marine Corps in May 2015 coordinated with Pratt & Whitney and Boeing to successfully remove a power module



U.S. Marine Corps photo by Cpl. Anne K. Henry

from its container, load it onto a sled that could fit inside a MV-22 and fly it out to an LHA. That November, based on the results of a cost-benefit analysis, the Navy—which had already chosen the Osprey as its next COD platform—designated V-22 internal transport as the primary method for resupplying carriers, LHDs, LHAs and LHA(R)s with F135 engine power modules.

The F-35 Joint Program Office has contracted Pratt & Whitney to redesign and produce a transport skid for the power module.

Being able to put the power module inside a V-22 is significant because other options such as the H-53 can only carry it about 50 nautical miles via external lift. The capability to transport the module internally extends the range considerably, up to 1,000 nautical miles.





*The Naval Air Systems Command Cargo Lab and Marine Operational Test and Evaluation Squadron (VMX) 22 evaluate a developmental V-22 Osprey compatible F-35 Lightning II engine component transport system aboard USS Wasp (LHD 1) in May 2015.*

Where the V-22 really shines is taking the critical logistics out to a distance that gives the carrier strike group flexibility. The CMV-22B is designed to carry maximum cargo for more than 1,100 nautical miles, whereas the C-2 can't fly that far in a maximum cargo configuration. Typical ship-to-shore planning is currently at a max range of 800-1,000 nautical miles, and the C-2A is very cargo-weight limited at that range. The Navy variant of the Osprey is not as limited—it will carry 6,000 pounds for 1,100 nautical miles, whereas the Greyhound can only take about 800 pounds of cargo with typical shore-to-ship mission planning constraints up to 1,000 nautical miles before it runs out of gas.

It is also important to note that the CMV-22B will extend its range significantly over its Marine Corps counterpart, the

MV-22, with several engineering changes that provide more fuel and more operational range, making the Navy's variant uniquely suited to the COD mission.

"Making the decision to designate the CMV-22B as the primary F-35C at-sea support platform resolves a lot of logistic uncertainty," said Capt. Rick "Slash" Crecelius, former Commanding Officer of Strike Fighter Squadron (VFA) 101 and current deputy director of the Navy's F-35C Fleet Integration Office.

In addition, the Osprey will allow for direct delivery to amphibious ships as well as carriers.

It's transformational in that it gives us a lot of flexibility for the future of logistics. We can take more cargo further, while cutting entire legs out of the supply chain.

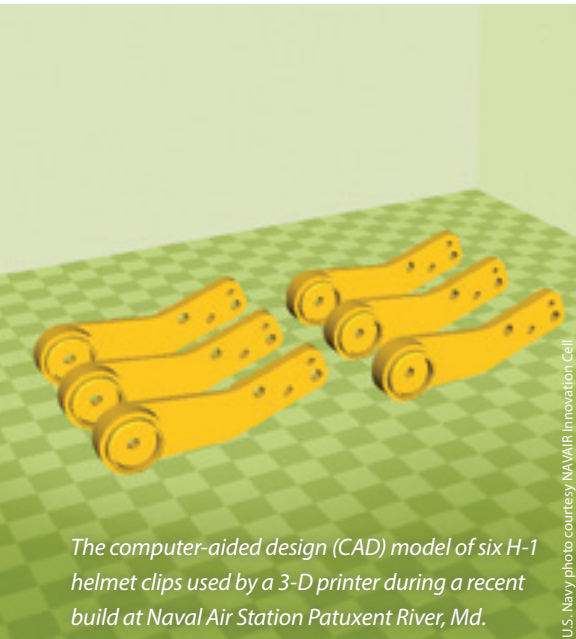
The first batch of C-2 pilots transitioning to the V-22 began training in October

at Marine Corps Air Station New River, North Carolina. The Navy will purchase the CMV-22B next year, with fielding of the first test aircraft projected for the end of 2019 and delivery of the first operational aircraft in 2020.

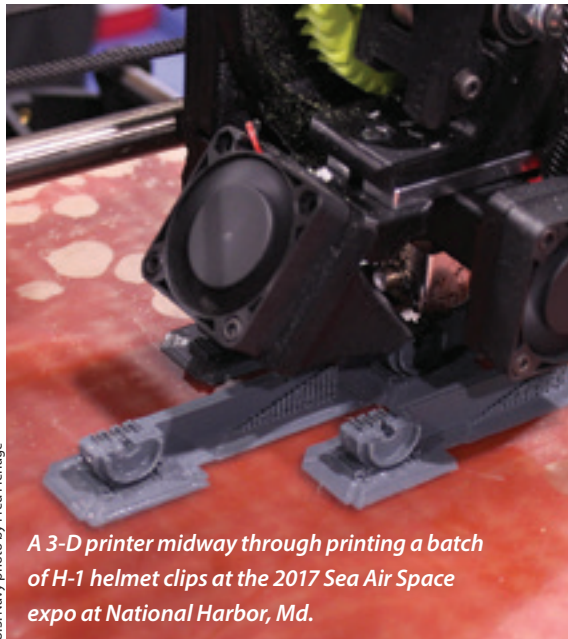
The CMV-22B is scheduled for deployment in 2021, in line with the initial operational deployment of the F-35C as well as follow-on CVW deployments, including the planned transition with forward deployed naval forces.

*Cmdr. Sam Bryant is the requirements officer for the Navy CMV-22B, Office of the Chief of Naval Operations, Air Warfare (OPNAV N98); Lt. Col. Mark Woodard, is the requirements officer for the Marine Corps MV-22, OPNAV N98; and Mr. Randle Tolliver is the deputy requirements officer for the Navy CMV-22B, OPNAV N98.*

# HITTING PRINT: NAVY ON BOARD



The computer-aided design (CAD) model of six H-1 helmet clips used by a 3-D printer during a recent build at Naval Air Station Patuxent River, Md.



A 3-D printer midway through printing a batch of H-1 helmet clips at the 2017 Sea Air Space expo at National Harbor, Md.



A completed 3-D build of H-1 helmet clips at the 2017 Sea Air Space expo at National Harbor, Md.

By Jeff Newman

When the team of engineers standing on the flight line let out a cheer as an MV-22B Osprey took off outfitted with a 3-D printed flight-critical part last July, it was with the hope they had finally demonstrated the potential of additive manufacturing to revolutionize how the U.S. Navy maintains its platforms and equips its Sailors.

## Message received.

In the past year, the Navy has seen a surge in interest and experimentation with additive manufacturing (AM), and nowhere more so than in Naval Aviation, where the current initiative began in earnest with the development of a roadmap by the Naval Air Systems Command (NAVAIR) in September 2014.

Whereas traditional “subtractive” manufacturing involves bulk materials being cut or machined down into desired objects, additive manufacturing refers to the process of using 3-D printers to build objects in layers using materials like plastic polymers or powdered metals.

Using digital models, 3-D printers can create in hours objects that would normally take days or weeks while allowing for innovative designs that wouldn’t be feasible using traditional manufacturing methods.

And yet, while working to bring their first project—a 3-D printed link and fitting that secures an Osprey’s engine nacelle to its wing—from concept to reality, NAVAIR engineers initially encountered skepticism that their part could be as strong and safe as its traditional version.

The naysaying came to a halt after component testing proved it to be as sturdy, and in some areas more so, than the original link and fitting, and it flew aboard an MV-22B at Naval Air Station (NAS) Patuxent River, Maryland, July 29—marking the first time an aircraft had flown with a 3-D printed flight-critical part.

“That flight has driven a change and a shift in how we are looking at AM and how we want to scale it across the command,” said Liz McMichael, NAVAIR’s additive manufacturing and digital thread integrated product team lead. “We showed that we could do it, so now people want to know how to do this and whether it really scales. Do we have the right focus and priorities? Do we have the right processes in place to manage this? Not yet, but that’s what the roadmap is intended to address.”

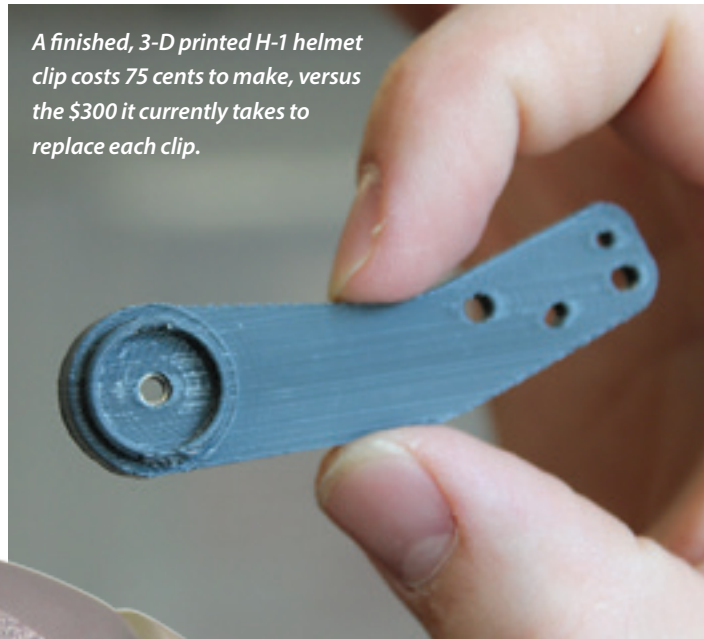
As attention and support directed at additive manufacturing projects grew exponentially in the past year, and more ships and maintenance depots have acquired or expressed interest in getting 3-D printers, McMichael said it became clear there was a need for a workforce that understood the technology. To that end, NAVAIR has stood up innovation cells and ‘fab labs’—



# WITH ADDITIVE MANUFACTURING



A finished, 3-D printed H-1 helmet clip costs 75 cents to make, versus the \$300 it currently takes to replace each clip.



U.S. Navy photo by Fred Flerlage

short for fabrication labs—across the organization so that Sailors, Marines and civilian engineers can learn what the technology offers.

“Unless you’ve really played with AM machines, you don’t understand how adaptable they are and how you might be able to use them in ways you haven’t thought about,” McMichael said.

As more Sailors and Marines are exposed to the technology, they are coming forward with additive manufacturing solutions for maddening readiness problems.

“Basically everybody we talk to, whether we come to them with a solution or they come to us with a problem, more projects come up,” said Giles Howlett, team co-lead at NAVAIR’s logistics innovation cell. “We have one idea, and they come back with two. There’s a lot of need for this kind of process.”

## Printing Quick Fixes

The Navy recently signed off on one of the cell’s solutions—a 3-D printed version of an H-1 helmet visor clip that frequently breaks when Marines bump it into something—making it the first AM



U.S. Navy photo by Fred Flerlage

When finished, the H-1 clip, as seen here, is attached to the visor, securing it to the helmet.

**“The original clip, which secures the sun visor to the helmet, cost more than \$300 a pop. ‘I can make this one for 75 cents,’ McMichael said. ‘If anyone asks, is there a business case for AM? Yes, there’s a business case for AM.’”**



U.S. Navy photo by Adam Skoczylas

***“It’s the absolute greatest game changer to manufacturing. It allows anybody to do anything. You can come up with new ideas, new ways of doing things, and then you can physically touch those ideas and make changes from there.”***

**—AT1 Michael Pecota**



*The front panel on flight deck cranial helmets is among the items Naval Air Systems Command engineers and Sailors at Fleet Readiness Center Mid-Atlantic Detachment Patuxent River are working on as part of 3-D Sailor, an effort to 3-D print plastic components of flight deck gear.*



U.S. Navy photo by Adam Skoczylas

part in the Navy supply system approved for fleet operations.

The original clip, which secures the visor to the helmet, costs more than \$300 a pop.

“I can make this one for 75 cents,” McMichael said. “If anyone asks, is there a business case for AM? Yes, there’s a business case for AM.”

In its search for projects, the innovation cell—now a year old after standing up May 2016—heard last winter that the H-1 program office was looking for a way to more quickly replace the clips. The process of designing and printing the tiny part began in earnest a few months later, and in April the cell had its clip approved.

Howlett sent an initial batch of 73 clips to the program office for approval in March, when it was discovered that an alignment hole was slightly off. The setback quickly morphed into a chance to showcase the speed enabled by additive manufacturing—upon hearing of the issue, Howlett was back at the cell, and had two redesigned clips printed out within four hours. Those clips were mailed out the same day along with four of the original design that Howlett fixed by hand.

“The strength of additive manufacturing

is that I can make a design change and print it in a morning,” he said.

Howlett said the hope in the near future is to have the H-1 clip approved for the 3-D printer at Marine Corps Air Station Camp Pendleton, California, so that Marine Aviation Logistics Squadron (MALS) 39 can print its own clips as needed.

“Our goal as the innovation cell is to be the incubator, not to be a production facility,” he said.

The innovation cell is housed inside the Fleet Readiness Center Mid-Atlantic (FRC-MA) hangar at NAS Patuxent River, putting its engineers steps away from the Sailors who make up the FRC’s own innovation team.

Together, the two groups are working on 3-D Sailor, a project aimed at saving money and ship space by 3-D printing the plastic components of flight deck gear, such as whistles, traffic wands, the front panels on cranial helmets, and the clips on Sailors’ float coats.

“We break these clips all the time, and you can’t get spares—you have to order the whole float coat, and they’re a couple hundred dollars apiece,” said Aviation Electronics Technician 1st class Michael Pecota, assistant team lead for the FRCMA-Pax River innovation team. “And because anybody shipboard that goes above deck has to wear them, they have to keep a lot of them on hand in case they break.”

Navy ships could put 3-D printers on board—a concept demonstrated on USS Harry S. Truman (CVN 75) in late 2015—and give the fleet the ability to quickly fix problems.

It only takes the team a few weeks to design the 3-D printed parts, with the goal being that Sailors in the fleet will then be able to take those designs and print their own parts on-demand while at sea. To that end, the teams are developing digital technical data packages (TDP) for each part.

Essentially a robust digital instruction manual, a TDP “encompasses everything that you need to print the parts successfully,” Pecota said. “What the tolerances are, how you verify that what you got is what was intended, how you make sure the file is accurate, all the infill diameters, all the information you need.”



Also, because 3-D printing is not currently a rating or skill taught in Navy training courses, the TDPs will come with a basic curriculum teaching Sailors how to use their ship's printer.

Another aspect of 3-D Sailor is the implementation of a procedure to test the effects being at sea has on 3-D printers.

"How do 3-D printers react at sea during swell? The moving of the ship, does that vary it? Do you have to only operate them during low conditions?" Pecota said. "Temperature and humidity have a lot to do with the quality of your 3-D print as well, so do you need to have them in a separate room that is separated from those elements or are they okay in any space?"

Funded by the Navy's Innovation Sustainment Group, 3-D Sailor also ties into another project the team is working on—recycling of shipboard plastics into 3-D printer filament.

While there are many plastics that can be melted down into filament, the focus is on polyethylene terephthalate—commonly abbreviated as PET—which is what water bottles are made of and carries the number '1' as its recycling symbol. In textile applications, PET is better known as polyester.

On Navy ships, plastic bottles are melted down into large pucks and stored until port visits, when they're offloaded and recycled, Pecota said.

"You can't throw them overboard, you can't burn them off, you store them until you pull into port," he said. "But meanwhile, while you're at sea between port visits, melting the plastic down stinks up the ship, and storing it takes up a lot of space."

To turn the PET into filament, the bottles would instead be fed into a wood chipper-like machine and then fed into an extruder which pushes the chips into a heating element and produces long, thin strands that are then put on spools like fishing line.

"Those spools are used in the 3-D printers," Pecota said. "So the benefit is, you're still recycling all that waste, but now it makes those shipboard 3-D printing labs self-sustainable. They don't have to buy

more material, just reuse the plastics you already have on ship."

Another project, one of Pecota's favorites, is the 3-D printing of plastic plugs as a replacement for the metal honeycomb sheets—so called because they consist of hollow cells arranged in a honeycomb pattern, minimizing the amount of material and weight needed to provide reinforcement—that are currently used to patch any damage in an aircraft's surface.

"Traditionally, when you dent or damage an aircraft, even if it's a little dent, you have to bore out the section and hand-shape the honeycomb to fit the hole you've drilled, and then you seal it over with epoxy," Pecota said.

The problem is, because the honeycomb is made of hollow structures and inserted vertically into the damaged section, the epoxy "seeps all the way through" filling each cell before sealing at the aircraft's surface," he said. This not only adds unnecessary weight, but wastes epoxy.

In place of the honeycomb, the innovation team is looking into plugs that can be 3-D printed with a honeycomb interior and solid surface, reducing the amount of epoxy needed to achieve a seal. In addition, instead

U.S. Navy photo by Adam Skoczylas



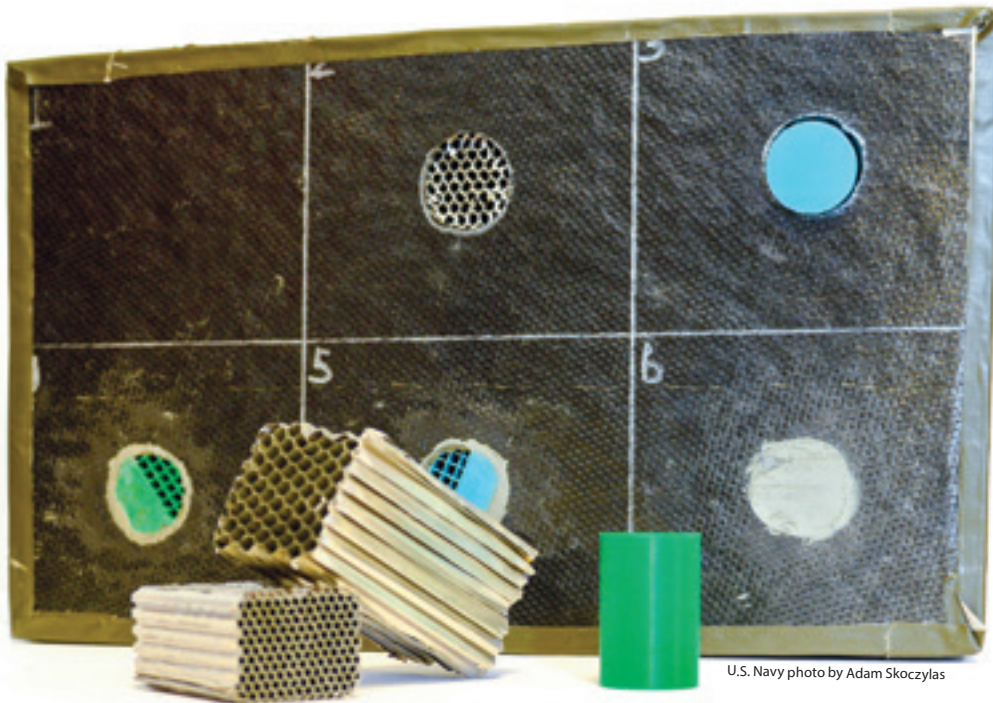
**"Basically everybody we talk to, whether we come to them with a solution or they come to us with a problem, more projects come up. We have one idea, and they come back with two. There's a lot of need for this kind of process."**

**—Giles Howlett**



U.S. Navy photo by Adam Skoczylas

*Sailors and engineers at Naval Air Station Patuxent River, Md., hope to save money and storage space aboard Navy ships by 3-D printing flight deck gear components—a project known as 3-D Sailor—such as the front clips on float coats.*



U.S. Navy photo by Adam Skoczylas

*Innovation cells at Naval Air Station Patuxent River are developing 3-D printed aircraft surface repair plugs (foreground, right) as a replacement for the metal honeycomb (foreground, left) currently used to patch damaged aircraft.*

of spending time cutting out honeycomb to fit drilled holes, Sailors could simply carry a few plugs that have been printed to fit standard hole saw sizes.

The two innovation teams have worked through projects at a brisk pace. When asked last summer to fabricate a small nylon clip that could be used to remove an F/A-18's gun while in maintenance, the group was given five days.

"We did it in three days," Pecota said.

Pecota credited that speed to the teams' co-location.

"We're not the only people that are doing this, but it looks like we're moving the fastest, and it's because of these guys," Pecota said, pointing to the NAVAIR engineers in the room. "There isn't too much from our team that's different from any of the other fab lab teams except for the engineers and the Sailors closely working together. We come up with the ideas, and they tell us how to make them happen, how to implement them and keep things safe"

Pecota runs FRCMA Pax River's communication navigation shop by day, but it's quickly evident when he speaks about

3-D printers that he's passionate about the subject. He owned his own printer well before the innovation team got one—when FRCMA didn't have a 3-D printer for the additive manufacturing booth at the 2016 Sea Air Space expo, Pecota brought his own—and a cap he created to cover sensitive sensors on submarine-locating sonar transducers won the inaugural Athena DC 1.0 innovation challenge in May 2016.

"It's the absolute greatest game changer to manufacturing. It allows anybody to do anything," he said. "If you can think of something you can make better, maybe the end result isn't going to be 3-D printed, but you can start there. You can come up with new ideas, new ways of doing things, and then you can take those ideas and physically touch them and make changes from there."

### **Enabling 'Engineering Agility'**

Success stories elsewhere in Naval Aviation abound.

When the manufacturer of the T-44 Pegasus trainer exhausted its supply of a forearm-length piece of air duct tubing used to circulate oxygen throughout the cockpit,

a tooling maker at Fleet Readiness Center Southeast in Jacksonville, Florida, used a 3-D printer to not only make the tubing for less money, but he improved on the design.

"The original piece was made out of two pieces of clear plastic tubing that had a flange all the way down its length," said Randy Meeker, the tooling maker. "I redesigned it to work better than the plastic model. It didn't need to be two pieces when I could print it as one piece."

At Naval Warfare Center Weapons Division (NAWCWD) in China Lake, California, engineers used a 3-D printer to make an inlet for the solid-fuel ramjet engine they are developing.

Doing so "dramatically improved our cost and our time to get the inlet to us," said Matt Walker, head of the Missile Performance Office at NAWCWD. "From a research and development standpoint, when you're looking at small quantities, it definitely increases your speed and reduces your cost associated with making the parts," Walker said. "We could probably go to a manufacturer to mass produce these for cheaper than we would do with additive manufacturing, but if we're just going through concept development, additive manufacturing gives us a much less expensive alternative and rapid turnaround time to be able to test out our components quickly."

Walker had long been interested in additive manufacturing as a way to build complex parts quicker and cheaper, so when NAWCWD got a new 3-D printer in September and was looking for projects to use it on, he was quick to offer up the ramjet.

"There was a little bit of churn until we figured out exactly how to layer the metals, what speeds we should be sintering the powders," he said. "There were a number of things we had to learn in order to finally get this good product."

That product ended up costing 40 percent less than it would have using traditional manufacturing techniques, and saw its production time slashed from four weeks to a week-and-a-half, said Nevin Hill, a mechanical engineer with NAWCWD's Applied Manufacturing Technology Division.



“The exciting thing to take note of is that the non-printed air inlet is actually an assembly consisting of 14 separate pieces, whereas the printed piece is a single part printed all at one time,” Hill said. “Additionally, printing allowed for the engineering team to make design changes that both saved weight and increased system performance due to the more complex geometry we were able to produce via the metal printing process.”

Walker said 3-D printing allowed his team to precisely design the inlet’s internal contour so that it would channel airflow more efficiently.

“It gives us that engineering agility to be able to design without the limitations of traditional machining. That’s another advantage of additive manufacturing, that you can print—so long as its structurally viable—whatever shape you want, things that you may not be able to create with traditional machining, or without at least very complex traditional machining,” he said. “Because we’re not limited by traditional methods, it opens up the design space. We can pretty much print up whatever we can conceive so that the flow is optimized for highest performance.”

Walker said the printed inlet “performed fantastically” in free-jet testing in late March, better than the traditionally manufactured inlets that had been used in previous tests. His team’s first test flight came last summer, when the ramjet accelerated to Mach 2.

Later flights pushed acceleration to Mach 2.45, but the 3-D printed inlet’s performance in free-jet testing had Walker expecting the next flight to reach Mach 2.75 or a little higher.

“This is about as good as we can get with an axisymmetric inlet,” Walker said. “It would be hard to beat this.”

## The Way Forward

Pecota said he could foresee additive manufacturing being incorporated into certain rates in the future, particularly machinery repairmen (MR), who already know computer-aided design (CAD)—a

chief component of 3-D printing—in order to operate computer numerical control machines. But in the short term, he would like to see an AM certification program open to any Sailor with interest.

“It’s anybody who has an interest, who has an idea of something that could be made better through AM, they can take the class,” Pecota said. “Like right now, you don’t go into a rate to learn to operate some of the support equipment that we use. You just go to a class, they teach you how to operate the equipment, and you walk away with a certification saying you are certified to do that. I foresee that’s what’s going to happen here in the beginning.”

Pecota noted that the FRCMA cell has been offering unofficial, one-day classes on basic CAD and how to operate a 3-D printer with great success.

“We’ve found that people walk in with no idea what 3-D or CAD is, but because they walk out understanding what they can 3-D print, they have ideas about what their job or work center is missing,” he said.

In one example, some Sailors realized they could 3-D print eyewash caps to replace a few that had broken at the FRCMA hangar.

“So we did it in one day,” Pecota said.

Meanwhile, McMichael’s team has expanded its scope and taken on projects such as embedding sensors in 3-D printed components—something that can’t be done with traditional manufacturing techniques—allowing for better monitoring of a part’s structural health. Propulsion and power engineers are exploring the 3-D printing of sand cast molds.

“Castings are a big readiness issue,” McMichael said.

But more than anything, McMichael is focused on developing the chain of data needed to turn additive manufacturing into a full-blown supply system.

“AM is not about the machines. AM is about the data that we use to drive the machines and manage the process and the risk,” she said. “We need to understand and make sure that even if people



U.S. Navy photo

***“We’re talking about being able to do dynamic, on-demand manufacturing of whatever we need. If you do it right and you follow the right process, it will help, and it will change readiness and the timeline we have to solve our problems by orders of magnitude.”***

**—Liz McMichael**

assert data rights, as lots of industry does, that we know where that is and we are able to work with industry to pay them for their data rights. We want a digital warehouse, not just parts on a shelf, and that’s a business model change.”

Along the way, the Navy will need to learn “how to accept risk in the right way and figure out how we can get our time to field down from years to months to days, and really we’re talking about being able to do dynamic, on-demand manufacturing of whatever we need,” McMichael said. “If you do it wrong, it’s a safety risk. If you do it right and you follow the right process, it will help, and it will change readiness and improve the timeline to solve our problems by orders of magnitude.”

*Jeff Newman is a staff writer and contributing editor to the Naval Aviation News magazine. 🦅*

# Navy Decommissions

# THE BIG E

By MC2(SW) Kevin F. Johnson

Aircraft carrier USS Enterprise (CVN 65) was decommissioned during a ceremony held in the ship's hangar bay Feb. 3, 56 years after "The Big E" debuted as the nation's first nuclear-powered flattop.



The eighth naval vessel to carry the name Enterprise was built by the Newport News Shipbuilding Co. and christened in September 1960 by Bertha Irene Franke, wife of former Secretary of the Navy William B. Franke. The ship was put to sea in 1961 and safely steamed more than 1 million nautical miles on nuclear power over her career.

Her first year in service was quite eventful, beginning with her initial shakedown cruise, which featured the recovery of astronaut John Glenn upon his return from becoming the first American to orbit the Earth. In October 1962, Enterprise was one of five carriers dispatched as part of the Cuban Missile Crisis. Two months later, Enterprise pioneered modern-day carrier operations when she became the first flattop to launch aircraft using a nose-tow

gear, or launch bar, which replaced the catapult bridle.

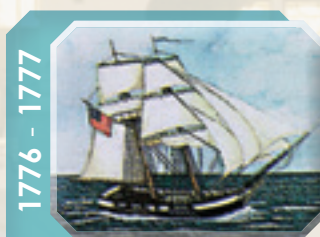
She deployed six times to Southeast Asia in support of the Vietnam War, and in August 1973 became the first aircraft carrier to deploy with the F-14 Tomcat. In April 1983, while returning home from deployment, Enterprise briefly ran aground while carrying aboard actor George Takei, who became famous for portraying Lt. Cmdr. Hikaru Sulu, helmsman of the fictional USS Enterprise of "Star Trek" fame.

Enterprise played a pivotal role in defending freedom around the world for more than a half century, from the Cuban Missile Crisis up through the wars in Iraq and Afghanistan—she launched the first strikes against al Qaeda and Taliban targets following the Sept. 11 attacks. By the time she returned to her homeport of Norfolk, Virginia, from her final deployment in

*A ship named Enterprise has defended the*



Enterprise I



Enterprise II



Enterprise III



Enterprise IV



November 2012, Enterprise had deployed 25 times with more than 100,000 total Sailors.

Through years of global presence, Enterprise cemented the Navy's worldwide maritime superiority, ensuring security and prosperity worldwide.

"For all that Enterprise represents to this nation, it's the people that bring this ship to life," said Capt. Todd Beltz, Commanding Officer of Enterprise. "So as I stand in this ship that we all care so much about, I feel it's appropriate to underscore the contributions of the thousands of Sailors and individuals that kept this ship alive and made its reputation. We are The Big E."

Rear Adm. Bruce Lindsey, commander, Naval Air Force Atlantic, used his own experiences aboard Enterprise to emphasize the unmatched adaptability and capability of nuclear-powered aircraft carriers.

"One cannot influence world events if you are not on station and stay on station; in other words, to be where it matters, when it matters," Lindsey said. "Nuclear carriers are tough and no other country can match us in this respect."

*"As this ship retires, we know the memory will live beyond her and we—the Sailors, the shipbuilders, the supporters of Enterprise—we are that link to the next Enterprise."*

During Enterprise's December 2012 inactivation ceremony, then-Secretary of the Navy Ray Mabus announced the legacy of Big E would continue, officially naming the third Gerald R. Ford-class carrier, USS Enterprise (CVN 80).

Though Enterprise's history is long and filled with numerous successful deployments, Beltz offered highlights from a letter written by Adm. James Holloway III, Enterprise's third commanding officer, which looked toward the future of the namesake in the proposed construction of the ninth Enterprise.

"As this ship retires," Beltz recited, "we know the memory will live beyond her and we—the Sailors, the shipbuilders, the supporters of Enterprise—we are that link to the next Enterprise."

*Mass Communication Specialist 2nd Class (Surface Warfare) Kevin F. Johnson supports Commander, Naval Air Force Atlantic Public Affairs.* ✈

## *U.S. at sea for the bulk of the last 240 years*

1877 - 1909



Enterprise V

1916 - 1919



Enterprise VI

1938 - 1947



Enterprise VII

1961 - 2017



Enterprise VIII







# EA-6B Prowler

## Last of Dedicated Marine Corps Electronic Warfare Platforms

Story and photos by Todd Miller

The unmistakable Grumman EA-6B Prowler comes into view on the horizon and streaks low across the hills of southern Virginia. “Dog 31” of Marine Tactical Electronic Warfare Squadron (VMAQ) 3, “Moon Dogs,” is on a routine, low-level training mission.

**T**he flight ensures pilot and electronic countermeasures officers (ECMOs) meet the minimum 15 hours of monthly flight time to maintain proficiency. Additional time is spent training in simulators to address specific threat environments. The Prowler wings by, banking into the late afternoon sun, a visual metaphor as sundown for the Prowler fleet draws near.

Prowlers remain one of the premier electronic warfare (EW) aircraft in the services and are scheduled for sundown in 2019. Prowler squadron VMAQT-1, the “Banshees,” was decommissioned in 2016, and the current Marine Aviation plan has the remaining squadrons following, one per year—the VMAQ-4 “Seahawks” in 2017, the Moon Dogs in 2018, and the last Prowler squadron, the VMAQ-2 “Death Jesters” in 2019. The 18 remaining EA-6Bs are based at Marine Corps Air Station Cherry Point, North Carolina, and are split among the three active squadrons, as needed. During this staged sundown, pilots and ECMOs have the option to transition to other aircraft or incoming EW platforms, or pursue new occupational specialties.

In many respects, the Prowler sundown is not a typical “retirement,” in which a platform with diminished capacity slowly fades away. Today’s Prowler is the most capable variant ever. The aircraft features an improved capabilities package and will receive upgrades to improve performance and operability to the end of its service life.

For more than 46 years—flown by the Navy since 1971 and Marine Corps since 1977—Prowlers have been involved in Navy, Air Force, Marine and coalition operations. Since 9/11, Prowlers have been deployed almost continuously. Recently, the aircraft served over Syria and Iraq to support the coalition fight against the Islamic State group.

By 2020, the Marine Corps will have adopted

a revolutionary change in how it addresses EW. Rather than replace the Prowler with a dedicated platform, the Marine Corps has adopted a distributed strategy where “every platform is a sensor, shooter and sharer.” This new paradigm brings together electronic warfare and cyber capability with the Marine Air-Ground Task Force (MAGTF) in a structure called the (MAGTF EW).

“Under MAGTF EW, the Marine Corps is leveraging emerging technologies and integrating multiple aviation platforms [unmanned, fixed-wing, tilt-rotor and rotary-wing assets], payloads, ground-based EW nodes and cyber capabilities to provide commanders with an organic and persistent EW capability—for every MAGTF—large and small,” said Capt. Sarah Burns, Marine Corps headquarters public affairs officer.

Within the MAGTF EW, each Marine Aviation platform will have the capability to carry its own pods packed with sensors and jammer payloads.

“This integration of manned and unmanned airborne and ground EW capabilities will provide the MAGTF commander with greater flexibility and control of the electromagnetic spectrum and, in many cases, give the commander a capability where previously they had none,” said 2nd Lt. Samuel Stephenson, Marine Corps public affairs officer for Marine Air Wing 2.

The Navy EA-18G Growler will continue the Prowler’s dedicated EW mission, while the Marine Corps’ F-35B and F-35C (replacing the AV-8B, F/A-18A-D and EA-6B) will provide the tactical aviation requirements with additional robust EW capability.

Todd Miller is an aviation writer and photographer. This article was first published Feb. 21 on *AviationPhotographyDigest.com*. 🐉

An EA-6B Prowler of Marine Tactical Electronic Warfare Squadron 3 from Marine Corps Air Station Cherry Point, N.C., on a routine low-level training flight over southern Virginia.

Photo by Todd Miller courtesy of AviationPhotographyDigest.com

# NAS Oceana Sailors and Marines

*By Jeff Newman*

Roughly 100 senior U.S. Navy officials gathered March 14 at Naval Air Station Oceana, Virginia, for a Boots-on-Ground event highlighting efforts by Sailors and Marines at Fleet Readiness Center Mid-Atlantic (FRCMA) to enhance Naval Aviation readiness.

**T**he event included a tour of FRCMA's facilities and several briefs from maintainers on recent initiatives aimed at saving time and money when repairing aircraft parts, principally for the F/A-18A-D Hornet and F/A-18E/F Super Hornet.

"As I walked around today, it was great to see young Sailors who had some innovative idea, or some ingenious way to attack a problem or approach a process that didn't cost us a penny, and in some cases, the return on that investment is huge. That is the value of doing these events and really the value of the innovative, smart, young Sailors we've got in the Naval Aviation Enterprise (NAE)," said Vice Adm. Mike Shoemaker, commander, Naval Air Forces.

FRCMA Commander Capt. Charles K. "Keith" Nixon said before the event that it had been planned as a "day in the life of an F-18." Sure enough, beginning with a visit to the Commander, Strike Fighter Wing, U.S. Atlantic Fleet and Strike Fighter Squadron (VFA) 106 hangar, the



*Aviation Ordnanceman Airman Morgan Taylor adjusts a hook while inspecting a BRU-32 bomb rack unit during the March 14 Boots-on-Ground event at Fleet Readiness Center Mid-Atlantic Detachment Oceana, Va.*



# Impress at Boots-on-Ground Event



*Capt. Christopher Boyle, commodore, Strike Fighter Wing Atlantic, speaks March 14 during an annual "Boots-on-Ground" tour of Fleet Readiness Center Mid-Atlantic (FRCMA) at Naval Air Station Oceana, Virginia.*

10-hour tour then proceeded to Oceana's avionics, airframes, armament, power plants and aircraft divisions.

In total, FRCMA Sailors and Marines worked more than 395,500 hours in fiscal 2016 repairing aircraft. Nearly 60 percent of that work went toward planned maintenance intervals (PMIs), while in-service repairs (ISRs) accounted for 20 percent.

FRCMA Aircraft Department Head Chris Rice discussed ISR management, stating that aircraft that otherwise would be flyable absent the need for specific repair work, as opposed to planned maintenance, receive priority in his shop. His team handled 1,900 ISR work orders last year, Rice said.

Among other things, a manual detailing common repairs and formal training for aircraft examiners would boost efficiency in getting F/A-18s out of the hangar and back on the flight line, Rice said. Training deployed Sailors and Marines how to better spot and prevent corrosion would also reduce the number of aircraft downed for repair work.

“Whatever we can do as an enterprise to facilitate the fleet taking care of these aircraft, it makes our job that much easier,” Rice said.

Vice Adm. Paul Grosklags, commander, Naval Air Systems Command, said the event was one of the most interactive and informative Boots-on-Ground events he had attended.

Though he came away impressed with some of the initiatives underway at Oceana, Grosklags said the NAE needs to ensure such efforts spread elsewhere.

“As we saw things that were being done successfully here, it underscores the need to more quickly replicate those successes at other sites,” he said. “We must figure out how to transfer that knowledge and learning more quickly from one organization to another. That’s the purpose and value of the NAE.”

*Jeff Newman is a staff writer and contributing editor to Naval Aviation News magazine.* 🦅



Aviation Structural Mechanic 2nd Class Karil Courtenay presents new maintenance procedures for the F/A-18E/F Super Hornet’s main landing gear shock absorber at the March 14 Boots-on-Ground event.

U.S. Navy photo by AMI Beena Ragoanath

## Efficiency Excellence Earns Petty Officer Naval Aviation Award By Rita Boland

Saving Naval Aviation millions of dollars in efficiency efforts earned Aviation Electronics Technician 2nd Class Virginia Anne Byarlay, the Work Center 01E/AIRSpeed lead petty officer (LPO) at Fleet Readiness Center Mid-Atlantic (FRCMA) Oceana, Virginia, a prestigious honor March 14.

Vice Adm. Mike Shoemaker, commander, Naval Air Forces, on behalf of the Naval Aviation Enterprise (NAE), presented Byarlay with the NAE Boots on the Ground Site Visit Excellence Award.

“Your vision and personal efforts have been responsible for elevating FRCMA Oceana to the next level of enterprise behavior,” Shoemaker wrote in his recognition letter. “The NAE will continue to benefit from your hard work, and each of us is appreciative of what you have done in support of the team.”

In her role as the AIRSpeed work center supervisor, Byarlay distinguished herself through contributions to the continuous process improvement (CPI) culture. She facilitated, coached and mentored 102 people through AIRSpeed improvement projects, resulting in a cost avoidance of more than \$2.5 million and identified nearly \$70,000 of savings in maintenance hours. She also served as the subject matter expert for a CPI standardization event. Daily, she directs six petty officers in the command-wide implementation of Lean Six Sigma (LSS) and the Theory of Constraints (TOC). Byarlay led five TOC/buffer status red (BSR) rollouts that impacted her command by reducing backlogs by 10 percent per

quarter and reducing the time to reliably repair (TRR) by 50 percent.

TOC is the theory that all work centers have some type of constraint. Byarlay’s team chose it as the process improvement methodology to assist with the rollout of the BSR report from the Buffer Management Tool program for all maintenance work centers at FRCMA. A BSR report predicts when each work center may have a potential for an expeditious repair. Since the beginning of the redesign, 39 work centers are either meeting or beating their current TRR and 18 are meeting their ultimate design TRR.

Additionally, Byarlay co-led the Huntron/Pinpoint Optimization effort that created a database that helps quickly identify LSS or troubleshooting tools available for evaluating a circuit card’s repair condition. Her work made the optimization option more readily available across all five FRCMA geographic locations; previously only part of the command used it.

“AT2 Byarlay is the driving force behind everything AIRSpeed and is responsible for spreading the culture of AIRSpeed like wildfire throughout FRCMA Oceana,” said Lt. Jeremy Neiman, Byarlay’s division officer. “Her passion to make everything and everyone better around her is what has always stood out to me.”

Neiman and ATC Mark Barbee, Byarlay’s lead chief petty officer at the time, nominated her for the NAE award.





Sailors at Fleet Readiness Center Mid-Atlantic Detachment Norfolk, Va., prepare to remove a component of an F-414 motor.

U.S. Navy photo by AMI Beena Ragoonath



U.S. Navy photo

Aviation Electronics Technician 2nd Class Virginia Anne Byarley, left, accepts the Naval Aviation Enterprise Boots on Ground Site Visit Excellence Award from Vice Adm. Mike Shoemaker, commander, Naval Air Forces during the March 14 Boots-on-Ground event at Naval Air Station Oceana, Va.

"She was handpicked back in May 2016 to bring the program back to relevance, which she has done, and exceeded our expectations," Neiman continued. "Not only has she done so through the events mentioned, but through our organic training and certifications. With her steering the helm, we now have 92 trained green belts, eight certified green belts and three certified black belts, which ensures we are ready to take on any CPI initiative in the future."

Belts are part of the LSS process. Practitioners pursue training and certification as yellow, green and black belts, indicating an increasing level of proficiency.

"I am very proud to receive this award," Byarley said. "When my team and I took over we had a lot of obstacles to face, and we were all excited to take on the responsibility of CPI for the command. With a little training and insight from our CPI lead [Carla Trent], we were able to tackle all the different tasks and bring CPI back to what it was intended to do. I would never be able to do what I do without the help from my AIRSpeed team, and I'm excited to receive this award on all of our behalf."

Byarley continues to work on her team coaching and LSS black belt certification. The time and effort necessary to reach these accomplishments are worth it to Byarley because of the benefits process improvement offers to readiness.

"CPI is important in Naval Aviation due to the aging aircraft on the flight line," she said. "With the increase to repair costs and with manpower being diminished, the enterprise is trying to find ways to extend the life of the aircraft and its components for mission readiness utilizing CPI methods."

Rita Boland is a communications specialist supporting Naval Aviation Enterprise Public Affairs. 🦅

# Professional Reading

By Cmdr. Peter Mersky, USNR (Ret.)



## ***Gear Up, Mishaps Down: The Evolution of Naval Aviation Safety, 1950-2000***

**Vice Adm. Robert F. Dunn, USN (Ret).  
Naval Institute Press, Annapolis, Md.  
2017. 204 pp. Ill. \$29.95**

“An experienced pilot was dead. A family and a squadron despaired. A shipmate lost, and aircraft lost, another statistic to add to the horrendous safety record of Naval Aviation in the 1950s.”

These lines are how retired Vice Adm. Dunn begins his book on the development and refinement of safety in Naval Aviation. No matter if you fly high-performance jets, slower-moving transports or helicopters, you need to be safe and promote safety in every squadron in which you are a member.

During its formative years from 1920 to 1960, Naval Aviation (which included the Marine Corps and Coast Guard) suffered hundreds of mishaps, resulting in hundreds of injuries and deaths.

One note: The use of “mishap” instead of “accident” is hard to explain for laymen and those not associated with Naval Aviation. Frankly, I have never seen a satisfactory definition. Often, the two terms are used interchangeably, as they sometimes are in this new book. I was once told “accident” implies human involvement and/

or human error, which resulted in injury, death or loss of a valuable aircraft. Then, the logical question is, doesn’t “mishap” mean the same thing? Probably, but for the time being, the official term is “mishap.”

The details in the book come not only from deep research—it began as Dunn’s project while a Ramsey Fellow at the Smithsonian’s National Air and Space Museum in Washington, D.C.—but also from the admiral’s own personal knowledge of the subject, which is at a level that few military authors can offer. A member of the Naval Academy’s class of 1951, he flew the AD Skyraider and then the A-4 Skyhawk. He saw combat with Attack Squadron (VA) 146 during the Vietnam War as part of Operation Rolling Thunder and eventually commanded the squadron in 1967. He commanded USS Saratoga (CV 60) in 1976, then served as Chief of the Naval Reserve from 1982 to 1983. He concluded his active service as Commander, Naval Air Force, U.S. Atlantic Fleet (COMNAVAIRLANT) from 1983 to 1986, and then as Deputy

Chief of Naval Operations for Air Warfare from 1987 to 1989. Most importantly for this book, he also served a tour as commander of the Naval Safety Center from 1976 to 1977, so he definitely knows his subject from the inside. And finally, a truly dedicated aviator, he made his last trap at the age of 60 at the controls of a single-seat F/A-18A Hornet in June 1988! You can’t beat those qualifications.

As he progresses through his history, Admiral Dunn describes the horrendous record of mishaps through World War II and during the post-Korean War period. He uses simple graphics, mainly charts to show the steep rising and falling rates typical of this dangerous time that saw the loss of so many people and aircraft, mainly from operational—rather than combat—causes.

He also includes the development of new and better aircraft instruments and ground simulators that helped crews fly their planes and, to an extent, curtail the mishap rate.



Art by Jim Laurier, courtesy Osprey Publishing Ltd.

*Cmdr. Robert F. Dunn’s  
assigned A-4C aboard  
USS Constellation (CV  
64), July 1967.*



Photo courtesy of Vice Adm. R.F. Dunn

*Then-Cmdr. Dunn after  
returning from a combat  
mission in 1967.*



There are detailed discussions of programs that emphasized the role of then newly established Naval Aviation Safety Center, whose staff strove to better manage understanding of safety in the air and on the ground. These sections of the book could have only been written by a highly experienced naval aviator, and better still, one who at one time had been at the heart of Naval Aviation safety by leading the command tasked with managing the Navy's safety programs. Dunn describes the introduction of the Naval Air Training and Operating Procedures Standardization (NATOPS) program in May 1961, with its far-reaching effect on every facet of Naval Aviation from its iconic blue-book compendiums of individual and specific aircraft types and models to operations aboard carriers and ashore. It's difficult to imagine Naval Aviation today without them.

The book also describes the now-Naval Safety Center's various publications, including its flagship magazine, *Approach*, first published in July 1955. Although that well-known magazine is currently undergoing a perhaps-painful transition in format—the long-range results of which remain to be seen—its historic effect on Fleet and Reserve aviation, with its longstanding invitation to Naval Aviation crews at all levels and specialties to contribute their experiences to educate compatriots, will always be an important contribution to the promotion of aviation safety in all communities.

While "Gear Up, Mishaps Down" should be of interest to anyone who follows military aviation, it should definitely be read by squadron commanding, executive and safety officers almost as part of their pass-down folders; that is, if the incoming officers haven't read it already. The squadron rank-and-file might also benefit from reading it. Finally, the book might also be useful to various industries and general civilian aviation as well. 🐦



### ***Famous Russian Aircraft: Mikoyan MiG-17, Tactical Fighter***

Yefim Gordon and Dmitriy Komissarov, Crecy Publications, UK, and Specialty Press. Forest Lake, Mn. 2016. 480 pp. Ill. \$64.95

Anyone familiar with mid-to-late 20th century military aviation should be well-acquainted with the long line of Russian fighters, the premier series

being that fostered by the MiG design bureau. "MiG" is, of course, a colorful acronym created by joining the last initials of designers Artyom L. Mikoyan and Michail I. Gurevich. The warning cry of "MiGs! MiGs!" was as much a part of early jet warfare as was "Achtung, Spitfires!" in European skies during World War II, and with just as much reason and fear.

Although MiG fighters did not play a major role in WWII—the only truly operational MiG was the early, rather elegant little MiG-3 that had largely been replaced by 1943—the MiG bureau quickly took its place after the war as the Soviet Union entered the jet age with the MiG-9 as well as designs from other bureaus. The world-beater MiG-15 followed and proved itself the equal of most of the West's fighters, including the American F-86 Sabre, which formed the major opposition the high-tailed MiG faced during the three-year Korean War. Flown by a competent pilot, the MiG-15 could take the measure of the Sabre, its speed and heavy three-cannon armament, giving it advantages that U.S. Air Force pilots definitely had to respect.

It was only natural that the MiG-15 would be improved on and give way to its near-big brother, the MiG-17, mid-way through the war, although the MiG-17 did not enter large-scale service until after the 1953 armistice agreement.

With that introduction, we consider this latest offering from Crecy and Specialty Press. At 8 ½ x 11 ½ inches, this is not a small book, and with nearly 500 coated-stock pages, it is particularly weighty. Nevertheless, it contains everything you ever wanted to know about the MiG-17. There is an all-encompassing collection of black-and-white and color photos, performance charts, pages of comparison tables discussing every MiG-17 produced, and every country for which it served. There is also a great number of color profiles that show every color scheme and marking the fighter ever carried as well as a brief but informative synopsis of whatever combat missions each country's MiG-17s might have seen. Those who flew against the MiG in Vietnam will find this section of special interest.

I don't know how many scale models of the MiG are available. Even those of its predecessor, the MiG-15, are rather small in number. But if you can find a model of the MiG-17, this veritable encyclopedia will show you all the interior and exterior detail you need to make it one of a kind.

There are a few errors, typos and missing letters, probably because of the need to produce the book in English, but these are quickly negotiated. One that really sticks is the constant reference to American back-seaters as "WSOs" or weapons-systems officers. While this term is correct for the back-seat position of a Boeing F/A-18D or F/A-18F, as well as USAF F-4s, the U.S. Navy and Marine Corps used the term Radar Intercept Officers, or RIOs, for the men in the rear cockpits of the F-4 Phantom and the F-14 Tomcat.

In general, however, the text is well and enthusiastically written. If you can get past the price, I highly recommend this unusually well-done book. 🐦



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- **FRC Southwest (North Island, CA):**  
FRCSW\_HR\_STAFFING/RECRUITING@navy.mil
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**NOTE:** Vacancies may not exist in every job series at all times or at all sites. U.S. citizenship and the ability to obtain and maintain a security clearance are required for all positions.



# Squadron Spotlight

## Strike Fighter Squadron (VFA) 32

**Established:** February 1, 1945

**Based:** NAS Oceana, Virginia Beach, Virginia

**Current Commanding Officer:**

Cmdr. R.W. Blizzard

**Mission(s):** *Support the Air Wing Commander by providing combat capable aircrew and aircraft ready to deter, defend or strike in accordance with national objectives*

**Brief History:** The VFA-32 "Swordsmen" began Feb. 1, 1945, as VBF-3 operating in the Pacific theater, flying the F6F-5 Hellcat. In 1946, VBF-3 transitioned to F8F-1 Bearcats and was re-designated as VF-4A, and in 1948, the squadron became VF-32 flying the F4U-4 Corsair.

VF-32 conducted strikes in support of the Korean conflict from 1950 to 1951. During a strike on the Chosin River, Ens. Jesse Brown, the first African-American Navy fighter pilot, was forced down in enemy territory. Squadron mate Lt. j.g. Thomas Hudner landed and attempted a rescue. Although his efforts were in vain, Hudner was awarded the Congressional Medal of Honor and Brown the Distinguished Flying Cross.

Following Korea, VF-32 transitioned to the F9F-6 Cougar and deployed in 1953 and 1955. In 1956, VF-32 became the first Navy squadron to transition to the F8U-1 Crusader, participating in the Lebanese Conflict in 1958 and the Cuban Missile Crisis in 1962.

From 1966 to 1985, VF-32 conducted deployments to Southeast Asia (1966), in support of the Middle East Crisis (1971), multiple deployments to the Mediterranean (1977, 1978, 1980, 1981 and 1984-1985) and conducted air strikes on Syrian positions in Lebanon (1982). VF-32 transitioned to the F-4B Phantom II in 1965 and to the F-14A Tomcat in 1974.

On Jan. 4, 1989, a section of the squadron was vectored onto two

approaching Libyan Mig-23s. They attempted a peaceful intercept, but hostile intent was evident and the Swordsmen fired AIM-7 and AIM-9 missiles, downing the two Libyan fighters.

VF-32 has conducted combat operations from Operation Desert Shield (1990) to Operation Inherent Resolve (OIR) (2017). In 2005, VF-32 transitioned to the F/A-18F Super Hornet and redesignated VFA-32.

On VFA-32's most recent deployment, the Swordsmen flew more than 150 combat sorties in support of coalition forces in Iraq and Syria. VFA-32 led Carrier Air Wing 3 in delivering 284,016 pounds of precision-guided munitions on enemy targets in support of OIR.

The Swordsmen have a proud tradition of service with honor, an unrivaled spirit and unmatched dedication. Committed to excellence, we are proud to go where duty calls.

**Aircraft Flown:** F/A-18F Super Hornet

**Number of People in Unit:** 250

### Significant Accomplishments:

- Presidential Unit Citation
- 6 Meritorious Unit Citations
- 3 Navy Unit Commendations
- 7 Armed Forces Expeditionary Medals
- 3 Navy Expeditionary Service Medals
- Southwest Asia Service Medal
- 9 Forces Service Medals
- 3 Navy E Ribbons
- Secretary of the Navy Letter of Commendation



U.S. Navy photo



# **NAVAL AVIATION NEWS**

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